Grow more Vegetables

EAT MORE VEGETABLES

By

Rai D. N. Mitra Bahadur

WITH A FOREWORD BY

The Rt. Hon'ble LORD SINHA

of

RAIPUR

●

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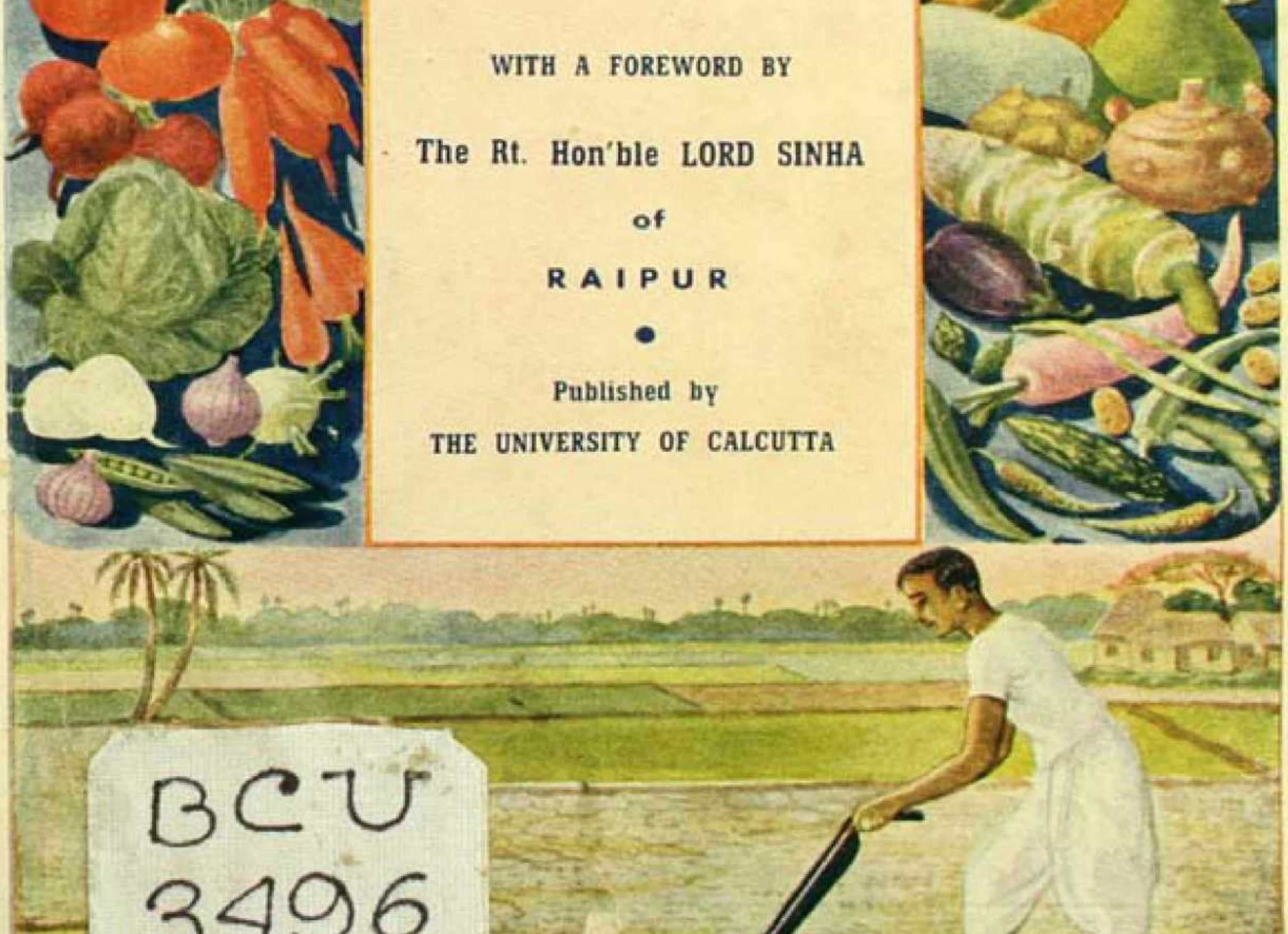

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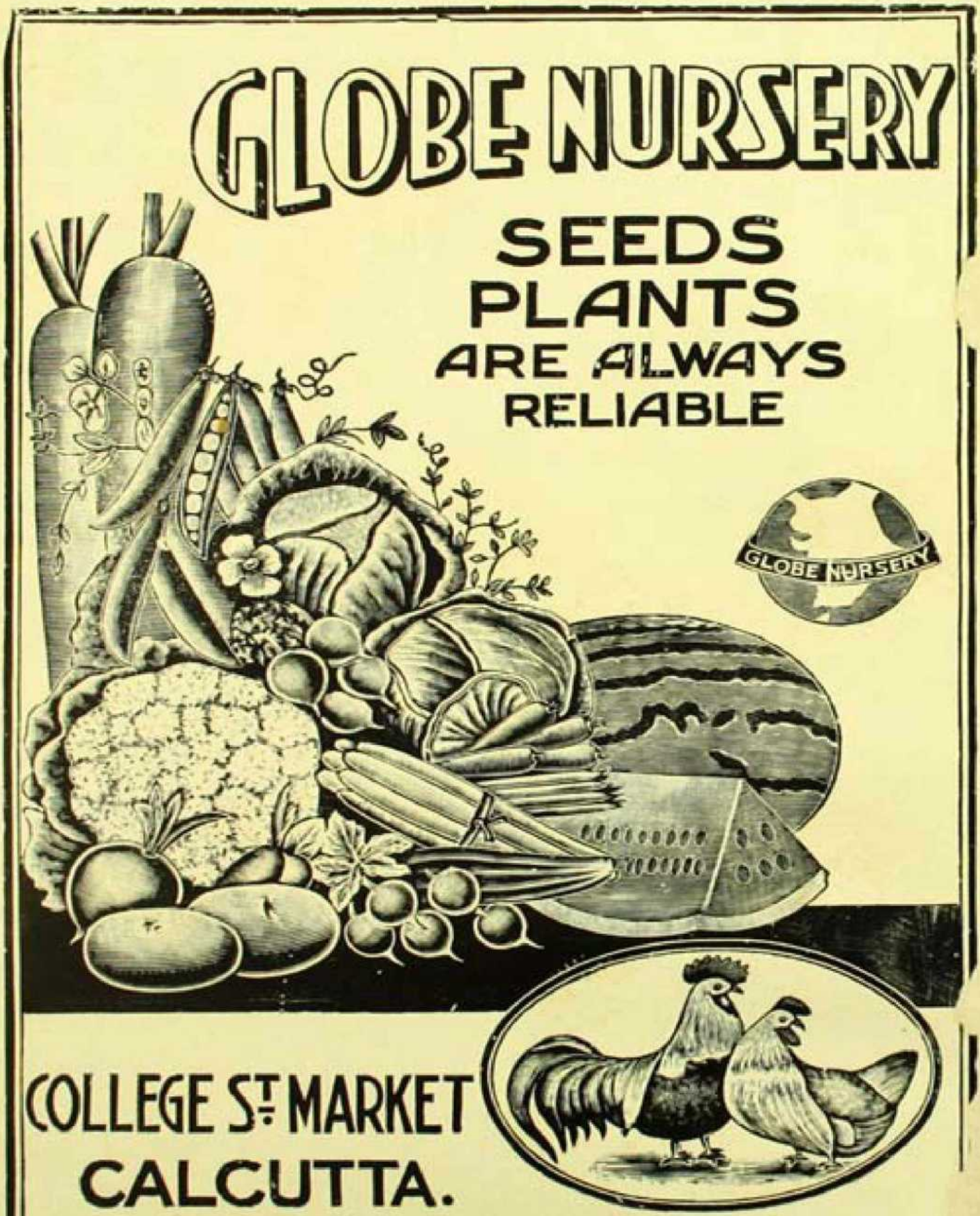

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TO

THE MEMORY OF

MY FATHER

WHO LIVED IN HIS VILLAGE
WHO LOVED HIS VILLAGE
WHO SUBSISTED CHIEFLY ON
THE PRODUCE OF HIS VILLAGE

AND

AT THIS DISTANT DATE
WHO IS STILL REMEMBERED BY
HIS VILLAGE.

GROW MORE VEGETABLES :
EAT MORE VEGETABLES :

BY

RAI D. N. MITRA BAHADUR
Special Officer, Food Production, Bengal.

UNIVERSITY OF CALCUTTA
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FOREWORD

"Grow More Vegetables—Eat More Vegetables" is a most welcome and timely contribution in the right direction and I consider it a privilege to be associated with it.

Apart from the temporary contingencies arising out of the war, the importance of growing and eating more vegetables even in normal times cannot be overlooked specially in a country where vegetarianism is so largely in vogue. It is well known that our national diet is defective, quantitatively and qualitatively but it lies within our means and scope to augment our food-supply and also to improve the quality at least to a certain extent. And in this respect we are exceptionally lucky both with regard to soil and climate. We can grow a variety of vegetables in almost every part of the province in each season of the year. And the author has given a very graphic account of a 'Kitchen garden' on a small plot of land showing to what a great extent it can help the people in respect of a supply of fresh vegetables throughout a season and in reducing the daily 'Bazar' expenses.

Upon a 'balanced diet' a nation lives, grows and flourishes, and vegetables form an essential part of it. We cannot, therefore, have a 'balanced diet' without the inclusion of one or the other kind of vegetable in our daily dietary. Rural Reconstruction is the talk of the day and I am definitely of opinion that to educate the people in a 'balanced diet' should be the first and foremost item of a Rural Reconstruction programme in order to make the people healthy and strong in body so that they may possess a healthy mind to think of, grasp, and act according to new ideas of improving their social and economic conditions. Let the gospel "Grow and eat a balanced food" together with proper recipes for serving up the vegetables in newer and more nutritive forms reach every hearth and home of the country. A feeble body with a feeble mind is incapable of, if not useless, for doing any good to society and to the country. "Dig for Vegetables" should be the common slogan and with the help of the existing organisations in the countryside a 'Kitchen garden' attached to every household may be made a chief feature of every village. I appeal to the educated community, both in the urban and rural areas, to set an example of it by growing some suitable vegetables on their lands attached to the homestead. I regard it as a call to duty in the interest of our national health.

The author needs no introduction at my hands. His contribution towards the development of agriculture in this country is well known. He knows very well what he is writing. And, I am sure, this brochure will inspire many to take to 'Kitchen gardening' and prove useful to those who are interested in the subject.

Sinha of Raipur.

PREFACE

The normal food-supply in the country has now been seriously affected by conditions arising out of the War, the chief of them being the very much reduced imports due to the difficulties of transport and at the same time to the increasing demand of the Defence forces. There is also no denying the fact that in the successful prosecution of the War, an adequate food-supply to meet the needs of the Defence services and also of the Civil population is as important and urgent a measure as any other directly connected with the War.

At the present time, it is, therefore, absolutely necessary for us to increase the habit of eating more vegetables which can be locally and also easily grown to compensate for the shortage of other food-stuffs, caused by transport difficulties. Every one, rich or poor, having suitable lands, should grow his own vegetables, as far as possible, thus relieving the pressure on the supply for Military requirements and also for the bulk of the Civil population.

Fresh and leafy vegetables contain all the kinds of vitamin which are most essential for the proper growth and nourishment of our bodies, and the inclusion of various kinds of seasonal vegetables in our daily dietary is thus of utmost importance to make our diet well-balanced and nutritive. Apart from the above considerations arising out of the War, even in normal times the growing of vegetables will therefore go a great way to augment a very nourishing food-supply and to save expenses; the middle-class families, specially whose only source of income is a small fixed monthly salary, will be very greatly benefited by it.

A very brief note on the functions of the various kinds of vitamin has been given in the Appendix. Dr. J. N. Maitra, M.Sc., M.B., D.T.M., D.P.H., has very kindly given me a note on " Eat a balanced diet " which has also been incorporated in the Appendix. Sample menues of " balanced diet " prepared by Col. A. C.

Chatterjee, I.M.S., former Director of Public Health, Bengal, and given in the Appendix, will no doubt interest and educate the readers in the subject.

Gardening is both a pleasure and profit, and it also affords a very good and healthy physical exercise and all the members of the family can join in it. Even for a lay man with little experience in gardening, in the beginning it would not be very difficult to grow some vegetables in his own compound, now left unused, with a few general hints on the subject. But a prudent man should however regard his first sowings as purely experimental, made with the object of acquiring experience in future years, and it would be wise on his part also to start his vegetable garden with the varieties which experience has proved to be suitable for the soil of the locality and which are the usual requirements of his household.

While he was in a Bengal district, the author induced many officials and non-officials there to start a 'Kitchen garden' in their compounds and a brief account of a small 'Kitchen garden' in the compound of the then Sub-divisional Officer there may be of interest to the readers. It was published in the "Modern Review" in the year 1929. The area of the garden was 45′×40′ and it had a bamboo fencing. The following vegetables were grown:

Vegetables	*Area*	*Outturn*
1. Cabbages & Cauliflowers	30′ × 10′	Cabbages . . . 40 Cauliflowers . . 26
2. Tomatoes	30′ one row	One maund
3. Peas	30′ two rows	30 seers
4. Potatoes	30′ × 30′	3 mds. & 12 seers
5. Beans		12 seers

In addition to the above, there were a few plants of country beans, brinjal, spinach, etc. and also a few plantain trees in the corners of the plot. There was no separate 'mali' to look after the vegetables. The Sub-divisional Officer used to work in the garden himself and one of his servants helped him. The expenditure was as follows:—

		Rs.	a.	p.
1.	Preparation of the soil	5	0	0
2.	Seed-potatoes	1	14	0
3.	Cattle dung	2	0	0
4.	Castor Cake	0	7	0
		9	5	0

He had his own seeds of peas, tomatoes and beans. He obtained seedlings of cabbages and cauliflowers free of cost from the local Agricultural Farm. These would not have cost him more than a rupee or so, if he had raised them himself.

The family of the Sub-divisional Officer consisted of seven persons, and by spending about Rs. 10/- only he arranged for the supply of fresh vegetables for the requirements of his family from December to March and the potatoes lasted for 6 or 7 months. He also distributed some vegetables to his friends. This garden also enabled him to keep the compound clean and tidy.

This brochure is intended for amateurs and contains some general and brief instructions on the cultivation of some principal English and Country vegetables to be easily grown in a 'Kitchen garden.' Seed-rates and approximate outturns per acre have however been given in the Appendix which may be useful to those who are desirous of growing these vegetables on a large scale.

The brochure does not also pretend any originality, and though it is not a comprehensive one, on the other hand, a very elementary one, many official and non-official publications on the subject have been consulted, chiefly, "*Vegetable Growing in the Delhi Province*" issued by the Imperial Council of Agricultural Research, "*The Culture of Vegetables and Flowers*" by Messrs. Sutton & Sons Ltd., "*An Amateur in an Indian Garden*" by Mr. S. Percy Lancaster, "*Elementary Agriculture*" by Dr. S. K. Mitter and "*The Standard Cyclopedia of Modern Agriculture and Rural*

Economy" published by Messrs. Gresham Publishing Co., Ltd., and free use has been made of them. And this is being most gratefully acknowledged.

Though the preface has been a long and perhaps wearisome one, I cannot resist presenting before the readers the following extract from an article "*Britain's Wartime Food Production Drive*" by Sir John Russel, D.Sc., F.R.S. in the hope that it may be illuminating to us and may stimulate us to follow in the same footsteps as far as possible:

"When war broke out it was clear that we could not indefinitely continue to import 60 per cent of our food, but it was also clear that we could not produce it all ourselves...... Two courses of action were adopted. Our national dietary was changed so as to reduce the consumption of meat, butter, and imported fruit, all of which take up considerable shipping space: Correspondingly there had to be an increased consumption of vegetables and potatoes. At the same time the most intensive production of grain, potatoes and vegetables was organised.......Many people are now growing potatoes, vegetables, and fruits: they keep poultry to give eggs, bees to produce honey, and rabbits to increase the meat supply: Some also keep goats to furnish more milk. All this is a complete addition to our old supplies. This additional home production of potatoes and vegetables has been a very great advantage. It has saved a great deal of transport, which, under present conditions, is extremely important, and it has ensured that a large number of households have some at least of their food always on the spot and always in good fresh condition.

....."So enthusiastically has the call 'Dig for Victory' been accepted that much open unused ground in towns and villages, derelict or half-used fields, parks, forecourts and other patches of land have been dug up and made to grow vegetables and potatoes."

I am more than grateful to Mr. J. E. Harradence of Messrs. Sutton & Sons Ltd., Calcutta, who has not only gone through the manuscript but has also given me very willing and painstaking help. To Messrs. Sutton & Sons Ltd., and the Globe Nursery, Calcutta, I tender grateful thanks for the loan of blocks for many of the illustrations in this book. Mr. K. R. Srinivasan, Stenographer of the Office of the Director of Rural Reconstruction, Bengal, has rendered me very valuable help in type-copying the manuscript. I acknowledge this help also with gratitude.

Lastly, I may add that although I am officially connected with the subject of this brochure, it has been compiled in my private capacity and the responsibility for its publication is entirely mine.

Antpur
District Hooghly
The 1st April, 1943

D. N. MITRA

What, indeed, is the use of spending public funds on objects such as education, welfare schemes and the like if the people have not the health and vigour of mind and body to take full advantage of them and to enjoy them? . . . . For, in truth, the response of the individual to the opportunities of life, whether economic, cultural or political, is inevitably inadequate in the absence of that vigour and ambition and of that joy in life which belongs to the possession of a healthy and balanced mind linked to a healthy body.

HIS EXCELLENCY THE MARQUESS OF LINLITHGOW,
Viceroy and Governor-General of India

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A COLLECTION OF ENGLISH VEGETABLES

Bengal Agricultural Dept.

GROW MORE VEGETABLES :
EAT MORE VEGETABLES :

SOWING CALENDAR

Month	Vegetables to grow	
	English.	Country.
January	Peas, Radish, Cress.	Sponge gourd, Bottle gourd, Cucumber, Melons.
February	Cress.	Brinjal, *Ucche*, Bitter gourd, Sponge gourd, White gourd, Cucumber, Melons.
March	Jerusalem Artichoke.	Brinjal, Roselle, Yam bean, *Kankri*, *Ucche*, Bitter gourd, Sponge gourd, White gourd, Red gourd, Radish, Cucumber, Cassava.
April	Jerusalem Artichoke.	Lady's finger, Chillies, Cowpea, Cape gooseberry, Roselle, Yam bean, *Kankri, Kankrole, Ucche,* Bitter gourd, Sponge gourd, White gourd, Red gourd, Snake gourd. Radish, Cucumber, Yams. Cassava, Arum (*Kachu*).

Month	Vegetables to grow	
	English.	Country.
May	Sword beans, Goa beans, Asparagus beans.	Brinjal, Lady's finger, Chillies, Cowpea, Cape gooseberry, Roselle, Yam bean, *Kankri, Kankrole,* Bitter gourd, Sponge gourd, Bottle gourd, Red gourd, Snake gourd, Country beans, Radish, Cucumber, Yams, Cassava, Arum (*Kachu*), Elephant's foot (*Ol*).
June	Sword beans, Goa beans, Asparagus beans.	Brinjal, Lady's finger, Chillies, Cowpea, Cape gooseberry, Yam bean, *Kankrole,* Bitter gourd Sponge gourd, Bottle gourd, Snake gourd, Country beans, Radish, Yams, Cassava, Arum (*Kachu*), Elephant's foot (*Ol*).
July	Sword beans, Goa beans, Asparagus beans, Radish, Cauliflower, Tomatoes, Globe Artichoke, Celery.	Chillies, Bitter gourd, Sponge gourd, Bottle gourd, Snake gourd, Country beans, Radish, Arum (*Mankachu*).
August	Peas, French and Runner beans, Beet, Radish, Cabbage, Cauliflower, Tomatoes, Globe Artichoke, Brussels Sprouts, Celery, Parsley.	Arum (*Mankachu*).

Month	Vegetables to grow	
	English.	Country.
September	Peas, French and Runner beans, Beet, Radish, Carrot, Turnip, Cabbage, Cauliflower, Knolkhol, Onion, Spinach, Lettuce, Tomatoes, Globe Artichoke, Brussels Sprouts, Celery, Cress, Leek, Parsley, Sorrel.	Onion, Sweet potatoes, Bottle gourd, Red gourd, Radish, Cucumber.
October	Peas, French and Runner beans, Lima and Broad beans, Beet, Radish, Carrot, Turnip, Potato, Cabbage, Cauliflower, Knolkhol, Onion, Spinach, Lettuce, Tomatoes, Globe Artichoke, Brussels Sprouts, Cress, Leek, Parsley, Parsnip, Sorrel.	Brinjal, Cowpea, Onion, Sweet potatoes, *Ucche*, Bottle gourd, *Patal*, Radish, Cucumber, Melons.
November	Peas, Lima and Broad beans, Beet, Radish, Carrot, Turnip, Potato, Cabbage, Cauliflower, Knolkhol, Onion, Spinach. Lettuce, Tomatoes, Globe Artichoke, Brussels Sprouts, Cress, Leek, Parsley, Parsnip, Sorrel.	Brinjal, Cowpea, Onion, *Ucche*, Bottle gourd, Red gourd, *Patal*, Radish, Cucumber, Melons.
December	Peas, Radish, Turnip, Cabbage, Spinach, Lettuce, Tomatoes, Brussels Sprouts, Cress.	*Ucche*, Sponge gourd, Bottle gourd, *Patal*, Melons.

CHAPTER I

SUITABLE SITE: LAYING OUT: SUITABLE SOIL: TILLAGE: MANURING OF THE SOIL: WATER SUPPLY: INJURIOUS INSECTS AND DISEASES: ROTATION:

SUITABLE SITE: LAYING OUT:

Low-lying tracts do not afford suitable sites for a vegetable garden, the soil being unduly heavy and moist, thus preventing the early sowing and planting so essential to the production of early crops. Vegetables cannot also stand waterlogging. The land should therefore be high and well-drained. It should also be open and free from trees. A south eastern aspect is to be preferred. The land should be fenced off by means of a good hedge which serves as both screen and protection. A good supply of water is an essential point for the successful cultivation of vegetables, and proximity to water is therefore a chief consideration for a site of a vegetable garden.

The laying out of the land should preferably be in the shape of a square or a rectangle which should be divided into plots or beds, with paths in between, along which the water channels may be run. Each plot or bed should be of a convenient size according to the area and size of the land, and should be well-levelled for the even distribution of irrigation water. Ridges and furrows may also be made at suitable distances, 1½ feet, 2 feet, 2½ feet or 3 feet apart for planting certain crops, namely, tomatoes, brinjals, etc. on the ridges with irrigation in the furrows. Similarly, basins may be prepared at required distances, 4, 6, or 8 feet apart for planting gourds, cucumbers, etc.

SUITABLE SOIL:

There are only four essential constituents of a soil—sand, clay, lime and humus. By various admixtures of these materials, varieties of soils arise of which eight classes may be taken as standard ones, clay being the basis of the terminology, and the largest ingredients being sand and clay.

1. Sandy soil (containing 10 per cent of clay and less than 5 per cent of lime). It is called 'light soil', because little force is required to draw implements through it.
2. Loamy sand (containing 10 to 20 per cent of clay and less than 5 per cent of lime).
3. Sandy loam (containing 20 to 30 per cent of clay and not more than 5 per cent of lime).
4. Loam (containing 30 to 50 per cent of clay and not more than 5 per cent of lime). It contains generally equal amounts of sand and clay with some admixture of decomposed vegetable matter, and thus it has the best characteristics of both sandy and clayey soils.
5. Clay (containing above 50 per cent of clay and not more than 5 per cent of lime). It is called 'heavy soil', because much force is required to work it.
6. Marley soil (containing more than 5 per cent but less than 20 per cent of lime).
7. Calcareous soil (containing about 20 per cent of lime).
8. Humus soil (containing more than 5 per cent of humus). (Humus is decayed animal and vegetable matter).

The functions of a soil as regards plant growth are briefly:

- (*a*) It serves as a foot hold.
- (*b*) It provides a suitable environment for the growth of the plant, and
- (*c*) It is a store house of plant food.

Subsoil is the term applied to the soil lying below the top 6 to 12 inches. It represents more nearly the original soil, since it is unaffected by cultivation or manuring of the surface soil. It is much poorer in plant food than the surface soil, and there is no advantage, but distinct disadvantage, in bringing it to the surface. The subsoil may be improved by growing deep-rooting crops which open the subsoil, increase its stores of organic matter, and effect a certain transference of plant food to the surface.

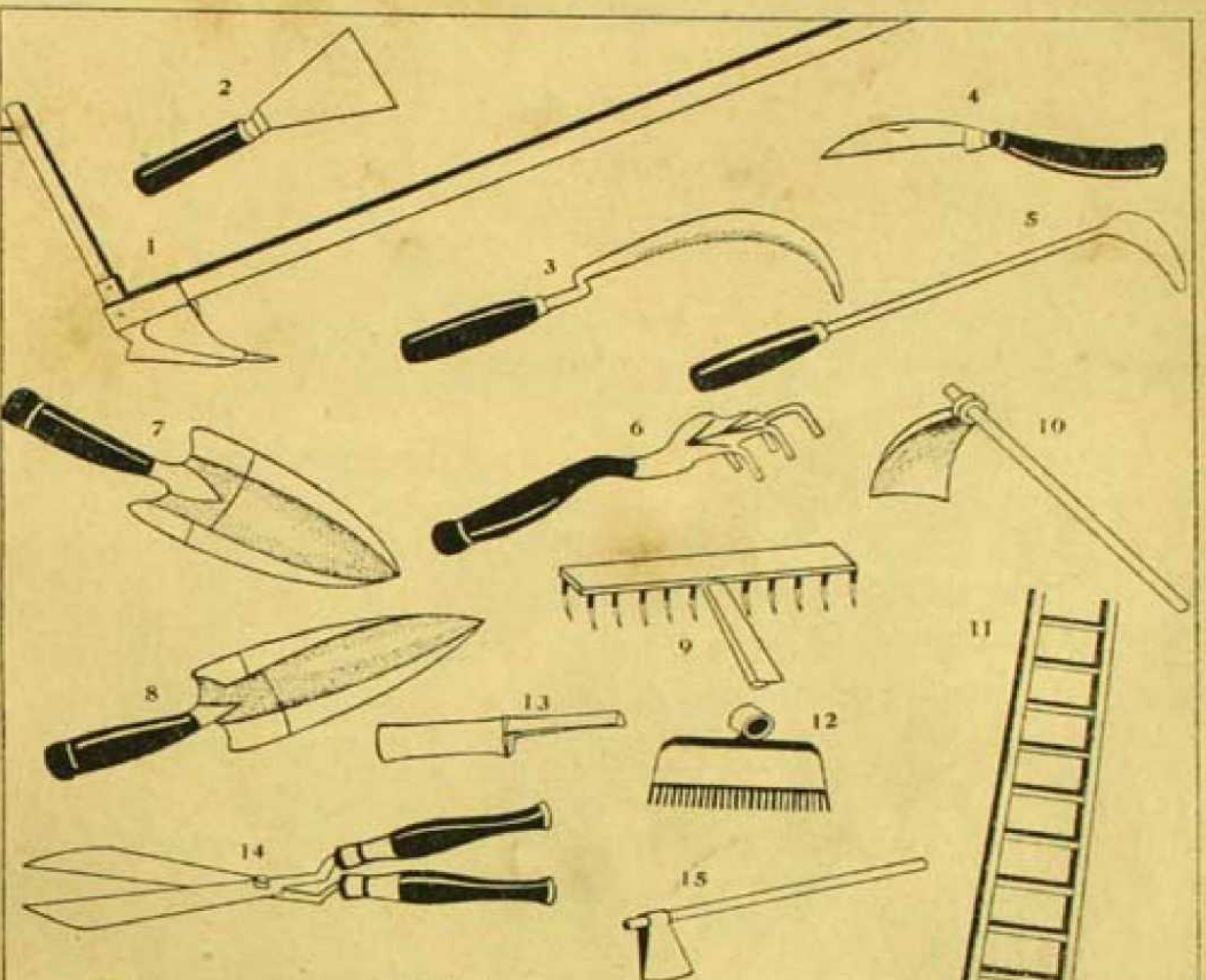
An ideal soil cannot always be found ready made for growing vegetables. The most favourable soil for the cultivation of the majority of vegetables (particularly deep-rooting crops) is however a deep medium loam of a nature more pertaining to that of a moist sandy texture than of a stiff retentive character. One that is stiffer suits leafy vegetables. Where shallow soils cannot be avoided, or where the subsoil is of inferior nature, these may be improved as much as practicable and economical by the introduction of suitable soil from other sources. In case of a shallow soil, it is also advisable to turn the top spit, and break up the sub-soil thoroughly for another 12 or 15 inches. A clayey soil may be made suitable for deep rooting vegetables if properly and frequently dug and mixed with lime, sand and humus, and also by green-manuring. (See *Manuring of the Soil*).

At least the top 1½ to 2 feet of the soil should be well-dug, thoroughly worked and manured in ample time before the seeds are sown, or seedlings are transplanted in it. The actual depth will of course depend on the extent of the top soil, for on no account should raw sub-soil be brought to the surface.

TILLAGE:

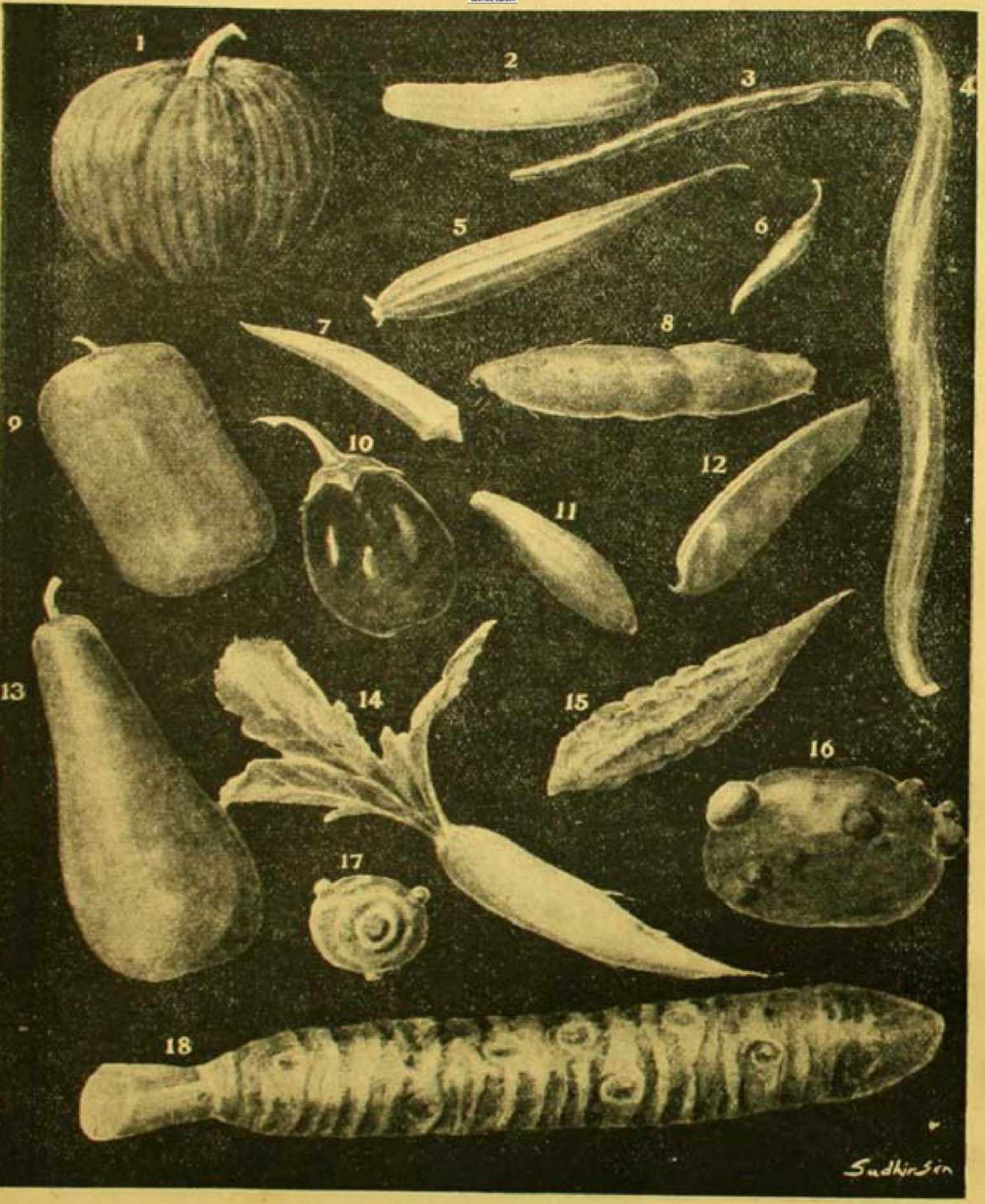
The word " tillage " has been applied to the different methods of working the soil in order to secure the conditions needful for the healthy growth of crops. The most active chemical changes and consequent liberation of plant food occur in that part of the soil which is actually and properly stirred up, and intermixed with fresh air from time to time. An adequate tillage is necessary to

GARDEN ACCESSORIES



1. Improved plough. 2. *Khurpi*. 3. Sickle. 4. Budding Knife. 5. *Nirani*. 6. Cultivator. 7. Trowel. 8. Transplantor. 9. Rake. 10. *Kodali*. 11. Ladder. 12. Garden Hoe. 13. *Mugur*. 14. Garden Shears. 15. Axe. 16. Kodali Fork. 17. Watering Can. 18. Bucket. 19. Prunning Knife. 20. Spading Fork. 21. Garden Pick. 22. *Shaval*. 23. Bill Hook. 24. Basket. 25. Shovel.

A FEW COUN VEGETABLES



1. Red Pumpkin (*Kumra*). 2. Cucumber (*Sasha*). 3. Cowpea (*Barbatti*). 4. Snake Gourd (*Chichinga*). 5. Sponge Gourd (*Jhinga*). 6. Chillies (*Lanka*). 7. Lady's finger (*Dhenras*). 8. Sweet potatoes (*Sukurkund*). 9. White pumpkin (*Chal Kumra*). 10. Brinjal (*Begun*). 11. *Patal*. 12. Beans (*Shem*). 13. Bottle Gourd (*Lau*). 14. Radish (*Moola*). 15. Bitter Gourd (*Karela*). 16. Elephant's foot (*Ol*). 17. Arum (*Kachu*). 18. Arum (*Mankachu*).

enable a soil to function properly. Generally speaking, the chief objects which tillage aims to secure, are:

(1) To develop uniformity of soil conditions suitable to the sowing of seeds and setting of plants:

(2) To hasten and augment physical and chemical actions in the soil which are helpful for plant production:

(3) To aid in the saving of soil moisture and to provide necessary aeration:

(4) To destroy and prevent the growth of weeds or other vegetation not desired upon the soil, and to destroy insects with their nests and other parasites which are harmful to crops:

(5) To place beneath the surface, manures, stubbles, etc. where they will not be in the way, and where they will be converted rapidly into humus:

Tillage is done by three classes of implements:

(*a*) By deep-working implements like ploughs, spades, etc.; these are used to break up soils:

(*b*) By surface-working implements like, hoes, 'khurpies,' spades, harrows, ladders, etc. These are used to pulverise the surface soil, to stir for aeration and conservation of moisture, to prepare the surface-soil for the reception of seeds, to cover the seeds, to destroy weeds, to earth up growing plants, to spread manures, to prepare furrows, etc.

(*c*) By compacting implements like rollers, beams, etc. The objects of using them are to crush and pulverise the surface soil by breaking clods, to level the surface soil, to cover the seed after sowing, to conserve soil moisture, etc.

Great importance should therefore be attached to tillage while preparing the soil in all its stages, and even while the crops are growing on it. It should always be remembered that the garden should be continuously hoed to keep the plots clean of weeds, jungles, insects, etc., and to aerate the soil. Manuring and watering are essential for the success of vegetable cultivation, but it is worth while remembering that without adequate soil-working even copious applications of manure and water will not be of much avail; on the other hand, proper soil-working will minimise the applications of manure and water.

MANURING OF THE SOIL:

It should be borne in mind that the productivity of the soil of a vegetable garden has always to be taxed to the utmost to obtain a succession of various vegetables suitable for each season of the year, and it implies abundant manuring. To take much off and to put little on is like burning the candle at both ends.

Farm yard manure is ideal for vegetable growing. The rate of application is usually 400 lbs for an area of 1,000 sq. feet. Leaf mould is also a very valuable manure for vegetables. It is specially useful for seed-beds. A constant supply of decayed leaf-mould may be arranged on the spot by sweeping up leaves and making a fresh heap every fall. In due time these leaves will decay and make useful potting soil. Manures should be applied when the land is prepared and should be thoroughly mixed with the soil. It is also imperative that the manures used should be well-decomposed. It will be wise to obtain the manure in advance of the requirements, and to dig the vegetable plots or beds immediately after the first monsoon rains, spread the manure over the surface of the soil, and mix it up with the soil by constant digging.

Green-manuring may also be practised. This consists of sowing a quick-growing leguminous crop and ploughing it into the land or incorporating it into the soil by digging it in. A dressing of lime immediately after ploughing in the green crop gives good results. Another point of importance is to remember that as soon as any crop has been collected from the vegetable garden, plants left in the plots should be cut down and dug into the soil, instead of allowing the stumps to remain and become woody, or transferred to the compost heap. Even if due to hard cropping, difficulties arise about the disposal of the produce, the proverbial three courses may be adopted, to sell, to give or to dig the stuff in as manure. The last named course will pay well, and in due time full value will be obtained for the buried crops and the labour bestowed upon them.

In view of the present scarcity of farmyard manure it is strongly recommended to compost all waste vegetable matter, including dead leaves, water hyacinth, all sorts of refuse, etc. A properly decomposed compost is equal or even superior to farmyard manure in its effect.

Artificial fertilisers available from the dealers in manures and fertilisers may also be used with advantage. A short note on "Manures and Fertilisers" given in the Appendix may be found useful. Preparation of compost and green-manuring have also been included in it.

WATER SUPPLY:

As mentioned above, successful vegetable cultivation is only possible when there is an abundant supply of irrigation water. The amount of water required depends on the soil, crop, prevailing weather conditions, the quality of the tillage, and also on the application of manures. Irrigation should be thorough without being too frequent, but given as required according to the condition of the soil. A practical tip to remember is that an adequate irrigation should be such that it will permit of hoeing or stirring with a "khurpi" after 24 hours in the hot weather, and after 48 hours in the cold weather. After each watering the surface soil should be loosened and pulverised and weeds removed in the process.

INJURIOUS INSECTS AND DISEASES:

Insects cause considerable damage to vegetables. They are always at work attacking all parts of the plant, the root, the stem, foliage, blossom, and seed. The roots are attacked by various ground insects which gnaw away at the surface of the roots, cut them in sunder or tunnel into them; others produce gall or deformities on them, and so stunt the growth. A few again even attack the plants below ground. The stems are attacked by biting insects and are tunnelled into, or may be damaged by sucking insects. The foliage is attacked by many insects and stripped and mined into and blistered, or it may be killed by the loss of the sap. Seedlings are killed by beetles which cut off the seedlings just below the seed-leaves, or so riddle the young leaves that the plants die. Blossom is also attacked by some insects, and the seed is ruined by some which mature in it.

"One pennyworth of prevention is worth a pound of cure" should be the maxim in the matter of checking the spread of insect attacks. The following recommendations are worth remembering:

(1) A strong healthy crop should always be grown, as it has the power to resist the attacks of insects.

(2) Weeds should be destroyed by clean cultivation, as it will diminish the number of host plants available for the insects. There should not also be weeds and grasses round the plots.

(3) Heaps of rubbish afford good hiding places and abodes for many insects. They should be removed from the plots. Similarly, manure pits or heaps are favourite breeding places for insects, and care should be taken to see that they are not very close to the garden.

(4) Stray plants of any crop should never be allowed to remain in the plots after the harvest of the main crop. Nor should any crop be allowed to throw

up fresh shoots after harvest, as they provide a home and food-supply for insects when nothing else is available.

(5) Rotation of crops reduces the attacks of destructive insects.

(6) The land should be ploughed well in summer, as it will kill eggs and pupa of many insects by exposing them to the sun.

(7) The soil may be consolidated by laddering to make it difficult for insects to get in and get out of it.

(8) A careful watch should always be kept for the first appearance of insects, and their spread may be checked by judicious hand-picking.

(9) Genuine and pure seeds free from any attack of insects should always be used.

A general knowledge of the life-history of insects and of some common remedies to combat them may suggest what is to be done, and the right time for doing it, so that often by simple treatment, they may be destroyed. A short note on it has therefore been given in the Appendix.

Many of our garden crops are liable to the attacks of diseases caused by fungus and bacteria. Fungus diseases are propagated very rapidly by dust-like particles, called spores, which float in air and settle on the plants where they grow. In some cases, it is possible to cure, but in others, preventives, which are better, may be used with partial or entire success. The proverb " Prevention is better than cure " is the slogan in dealing with fungus diseases. An application of a preparation called " Bordeaux mixture or Burgundy mixture " (see Appendix) is very useful to prevent the growth of organisms causing the diseases.

Plants raised from robust stocks grown in suitable soils and under favourable conditions are however less liable to disease than seedlings from feeble parents, or those which have been rendered weakly by deficiencies in the soil or faulty cultivation. It should, therefore, be remembered that disease generally begins with unhealthy specimens, and these form centres of contamination from which the mischief spreads. It is thus very important that seeds from healthy stocks should be sown, and that a vigorous constitution should be developed by good cultivation.

Diseases caused by bacteria are not so prominent in plants as in animals except in a few cases. The attack of the bacteria kills the plant entirely in a short time. They are very difficult to control. The common remedy is to uproot a diseased plant and to burn it completely.

As in the case of insects, the following general instructions may be helpful in dealing with the diseases of plants:

(1) Seeds before sowing may be washed with water in which copper sulphate has been soaked for about 20 to 30 minutes. (1½ oz. per gallon of water).
(2) Dustings of copper and sulphur powders on the leaves attacked by diseases may prevent their spread.
(3) Plants or parts of plants attacked with diseases should be removed and burnt down.
(4) Weeds, jungles, etc. must not remain in the plots or near about.
(5) Crowding of seedlings should be avoided.
(6) Rotation of crops should be followed.
(7) Clean cultivation and clean surroundings are strongly recommended.
(8) Seeds from healthy stocks should be sown.
(9) Vigorous constitution of crops should be developed by good cultivation.

ROTATION:

Rotation of crops is strongly recommended. Different groups or families of plants differ from each other in their rooting character, and in the amount and nature of the food-materials they take up from the soil. One crop repeatedly grown on the same land tends, therefore, to cause an earlier exhaustion of the soil in the special substances it requires, while the demand is also confined to that section of the soil in which that crop develops its roots. The frequent repetition of a crop on the same land tends to encourage the development of the fungoid diseases or insect pests special to it, which prey on and may ultimately destroy it. The alteration of crops of varying root character and development thus enables the resources of the soil to be more completely utilised, and postpones or prevents its exhaustion. A system of rotation thus assists materially in reducing the attacks of destructive insect pests and fungoid diseases, and also prevents the accumulation of injurious secretions in the soil from plants of the same family continually grown on the same plot. Again, in the system of rotation the growth of one kind of crop is made advantageous to another, immediately succeeding, either through its effect in cleaning the land, in ensuring its adequate tillage, or enriching it in nitrogen derived from the atmosphere. Generally speaking, rotation therefore serves the following purposes:

(a) It enables plants to make more equal use of the plant-food present in the soil.

(b) It saves them from serious attacks of insects and fungus.

(c) It is economical of manures.

(d) It keeps the soil much cleaner thereby raising its fertility.

(e) It reduces cost of labour.

In preparing a programme of rotation, the following should be borne in mind.

(1) Crops of the same natural order should not follow one another too freely.

(2) Deep-rooted crops should be followed by shallow-rooted crops.
(3) A weedy crop should be followed by a clean crop.
(4) Leguminous crops should find a place in every rotation.

Though it is found beneficial to practise some system of changing or rotating crops, owing to the small area of which vegetable gardens generally consist, and to the large variety of crops that are to be usually grown, it is almost impossible to practise any definite system of rotation. The most that can be done or aimed at is to group the various kinds of vegetables, and in this way change the position of each group annually. In order to enable the readers to follow a system of rotation, as far as possible, natural orders of the vegetables have been mentioned in the Appendix.

Lastly, in practical work there is nothing like method. Crop the ground systematically. Constantly forecast future work and the disposition of the ground for various crops, keeping in mind the proportions they should bear to each other. Sowing in drills at the proper distances apart is the best. Broadcasting is a slovenly mode of sowing and necessitates slovenly cultivation afterwards. When crops are in drills they can be efficiently thinned, weeded and hoed—in other words, they can be cultivated.

CHAPTER II

SEEDS: SEED BEDS: SOWING IN SEED BEDS: SEEDLINGS: TRANSPLANTATION OF SEEDLINGS:

SEEDS

Seeds of the more important imported vegetables are obtainable in three strains, namely, early, mid-season and late. To obtain a regular succession of vegetables, all these three strains should be sown one after another. The most important point is to sow the right variety of the seed at the right time, and for this the advice of the seedsmen with regard to the time of sowing of each variety should always be obtained and followed. The following instructions should also be remembered in this connection:

(1) It is always best to buy seeds from reliable dealers.

(2) When a consignment of seeds arrives at your destination, never open the parcel unless the seeds are immediately required for sowing. Exposure to damp atmosphere deteriorates the vitality of seeds.

(3) Get seeds by instalments; successive sowings will give a succession of vegetables extending over a long period.

SEED-BEDS

There are some crops, the seeds of which may be sown direct in the soil in which they will grow permanently, but there are some, the seeds of which are to be sown in seed-beds first, and then the seedlings transferred to the soil. In order to ensure proper germination of the seeds and to make the seedlings healthy and strong, great care should be taken in the preparation of the seed-beds. It will be worthwhile to remember the following instructions:

(1) Seed-bed should be raised and well-drained; its surface should be dug 9 inches to 1 foot deep, and the surface should be of fine pulverised soil, free from weeds, sticks, roots, insects, etc., and mixed with enough of leaf mould. Seed-bed may be made of 3 layers—in the first layer (2 inches) broken bricks may be spread, in the second (3 inches) loose clay soil and sand in equal proportions, and in the third and top layer (3 inches) ½ garden soil and ½ leaf mould.

(2) Seed-bed should be of 10 feet × 3 feet so that it may be worked up from one side.

SOWING IN SEED-BEDS

(1) Sow seeds by instalments for succession of crops as mentioned before.

(2) Very tiny seeds should be mixed with fine dry sand to make sowings more regular and certain.

(3) On sunny days seed-beds should be watered gently, and after a few hours of watering seeds should be sown in them. If the surface soil is found to be very damp it should be mixed with dry soil before sowing.

(4) Sowing should be as thin as possible, preferably in lines, 4 inches apart. Thick sowing always produces weak and diseased seedlings.

(5) Sowing should preferably be done towards evening.

(6) After sowing the seeds in seed-beds they should be covered with a thin layer of very loose soil which should be pressed gently by hand.

(7) To protect the seed-beds from rain and sun, there should be a cover of mats over them.

(8) Gentle watering should be done to keep the seed-beds

moist. Hand-watering should be just enough for it.

(9) Wood-ashes mixed with a little kerosene oil and spread round the seed-beds, keep off many insects; and similarly powdered castor cake if spread round the seed-beds, prevents ants.

SEEDLINGS

(1) After germination of the seeds the covering mats should be taken off every evening if no rain is apprehended at night, and the covers put on again at 8 or 9 in the next morning.

(2) Sunlight and air are needed for the proper growth of seedlings, or else they will grow up into sickly plants. But protection from scorching sun and rains should always be provided.

(3) Watering should be very gently done so that the seedlings are not disturbed. It depends upon the moisture on the soil. It is better to damp the seed-beds well by watering at an interval of 2 or 3 days than gentle watering every day. Evening is the best time for watering. Remember —*never water too much.* Gentle rains are most beneficial to the growth of the seedlings.

TRANSPLANTATION OF SEEDLINGS

(1) Seedlings when 1 ½ inches high should be tranferred to a second seed-bed and planted there 1 inch apart. Before transplanting, moisten the seed-bed. Seedlings should never be pulled up from the seed-bed, but always lifted with a little soil adhering to the roots.

(2) Evening is the best time for transplanting seedlings. A dull or showery day may also be chosen for it.

(3) Protect the newly transplanted seedlings from scorching sun and heavy rains.

(4) Watering should be done two or three times a week, as occasion arises, in the evening.

(5) After 10 to 14 days, the seedlings should again be removed to another bed, proper care being taken, as mentioned above, while removing them. They should now be planted more than one inch apart for sufficient space for development of leaves. Seedlings of cauliflower should thus be transplanted twice. It is essential for a good and healthy crop.

(6) Watering should be done as before, but more sunlight and air should be given to the seedlings now.

(7) When the seedlings are 4 inches to 6 inches high, they should be planted in the ground where they would grow. Care, as mentioned above, should be taken when removing them. Weak, diseased and insect-bitten seedlings should be discarded. Seedlings should be planted in holes sufficiently deep for the roots and a good portion of the stem, in straight lines, and the soil round the roots should be made firm with the hand, taking care not to bruise the plants in any way. Generally, except knolkhol and lettuce, seedlings of all the vegetables may be planted 2 feet to 2 ½ feet apart.

(8) After transplanting, watering should be done to enable the roots to be established in the soil, and subsequent waterings will depend upon the moisture of the soil.

(9) Protect the seedlings from scorching sun for about a week by covers made of the base of the plantain leaves or by any other like materials.

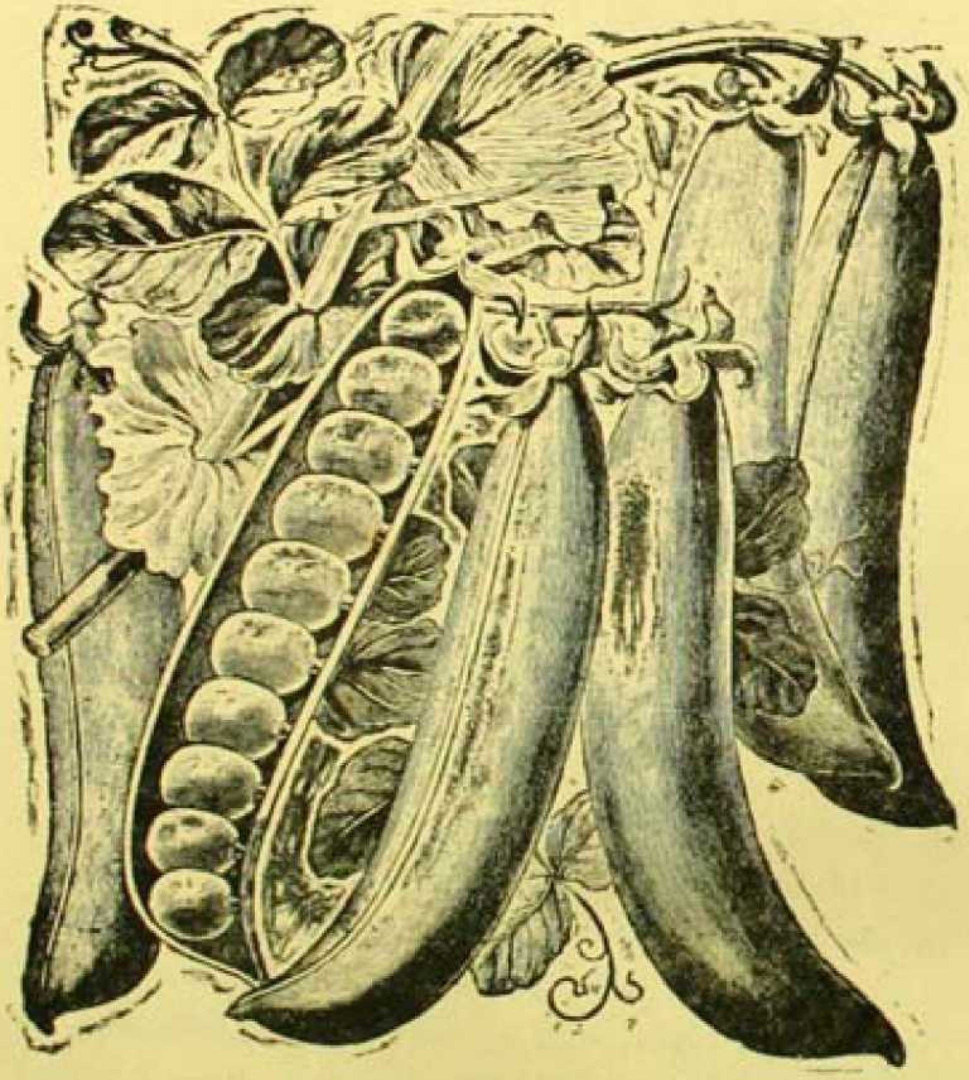
(10) Always remove the weaklings and put strong seedlings in their places.

CHAPTER III

SOME COMMON ENGLISH VEGETABLES: SHORT NOTES ON THEIR CULTIVATION:

PEAS

Of peas, there is an endless variety of both tall and dwarf kinds, early, mid-season and late. They are easily acclimatised and do not deteriorate for years.



PEAS The Globe Nursery.

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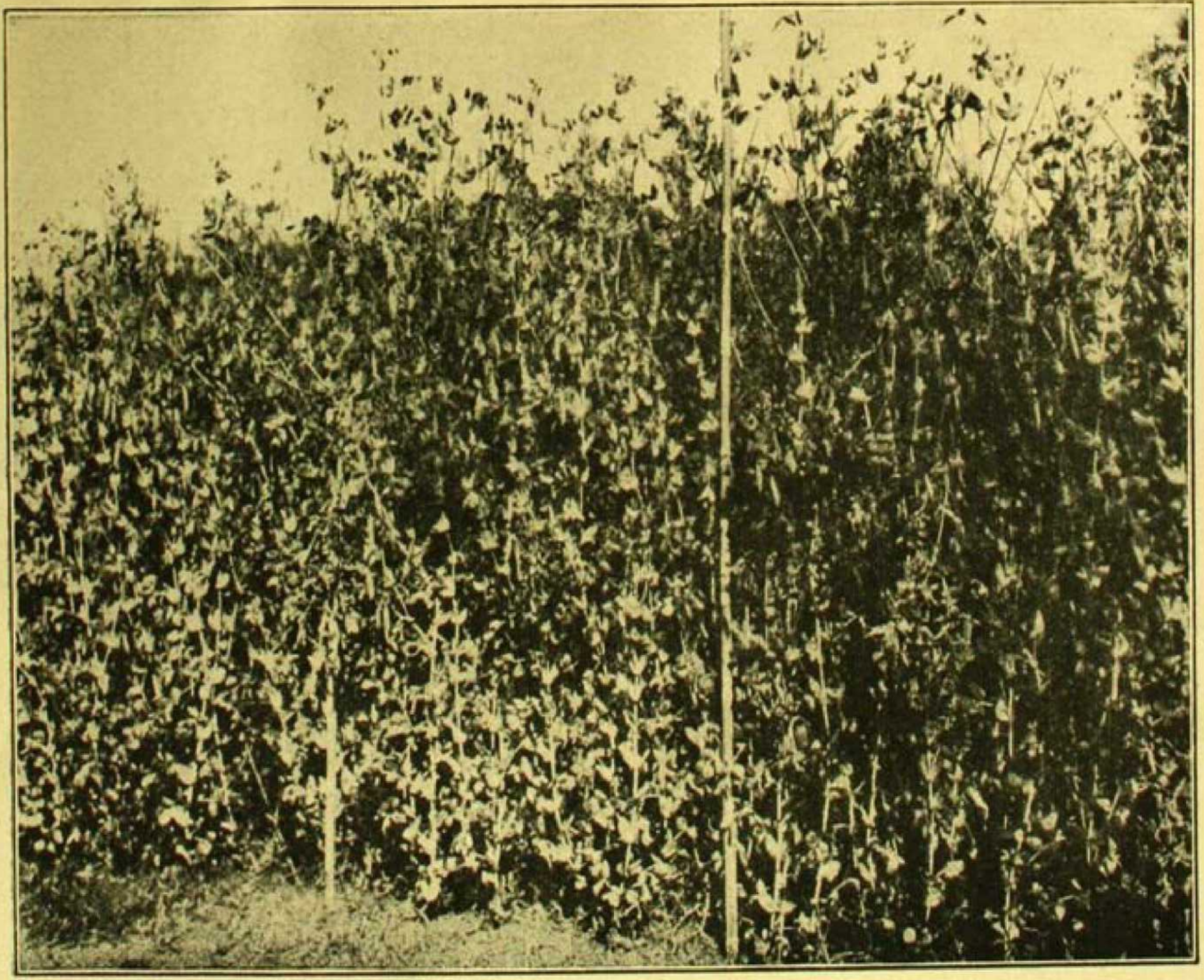
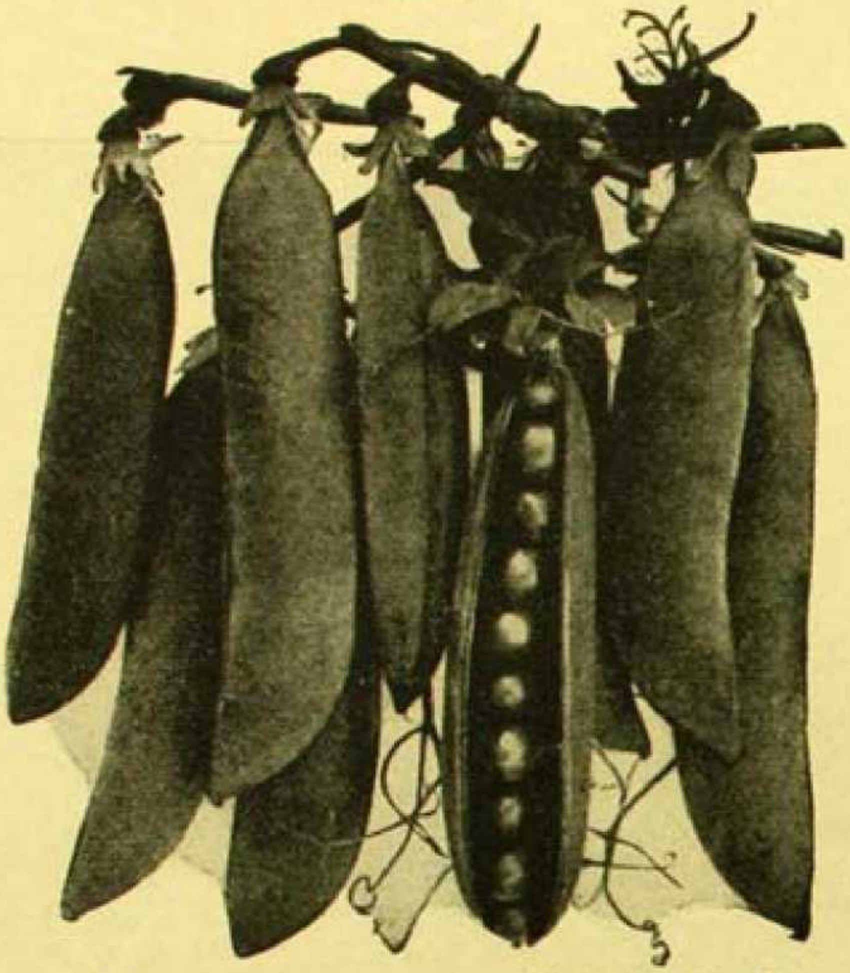


A PLOT OF PEAS

Bengal Agricultural Dept.

PEAS



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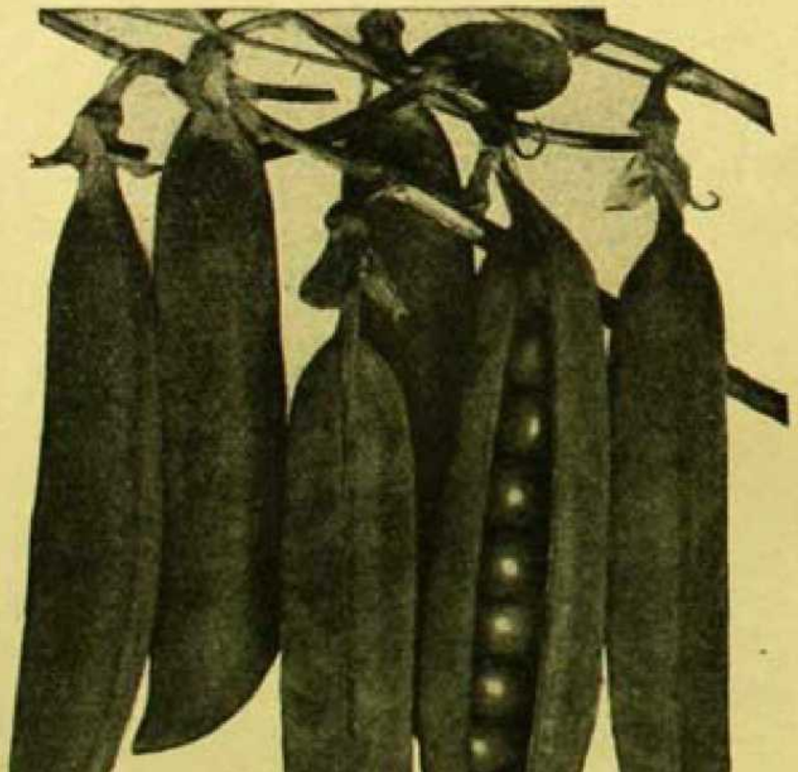

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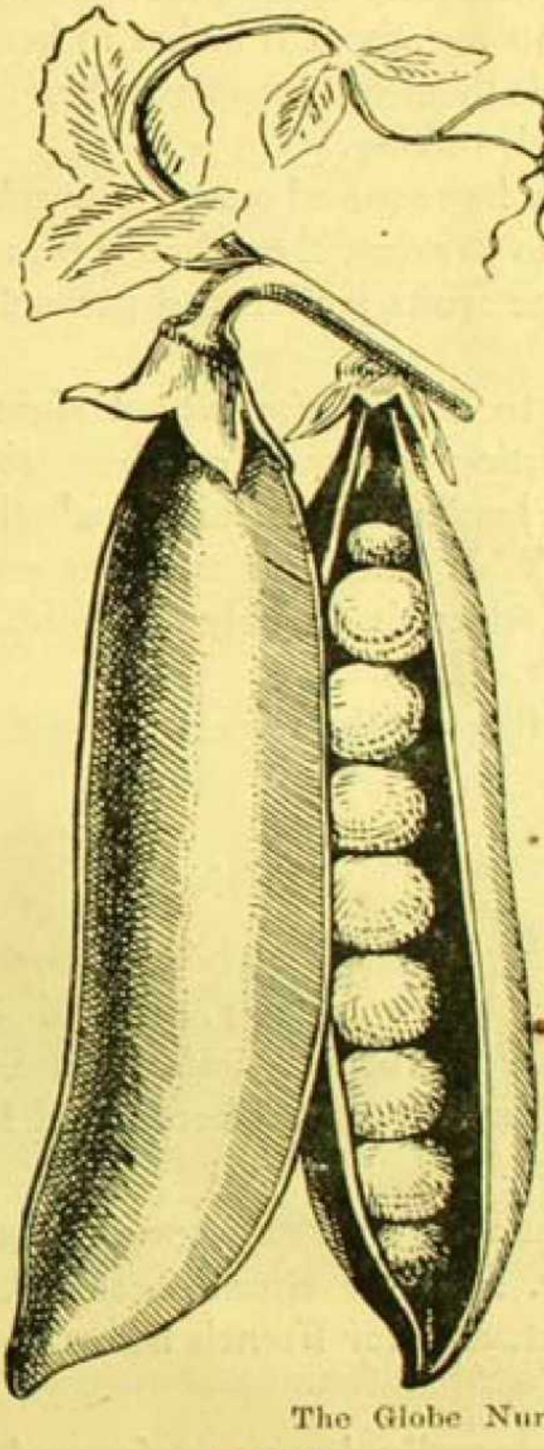
To sow a linear row of 100 feet, 1 lb. of seeds will be sufficient.



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PEAS

Seeds are generally sown from August to January, 3 inches deep, in rows 2 feet apart for the dwarf varieties, and 3 to 4 feet

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apart for the tall ones, the plants being 4 inches apart for the dwarf varieties, and 6 to 9 inches apart for the tall ones.

Germination generally takes place within a week to 10 days, and when the plants are about 6 inches in height, put in bamboo or jute sticks to provide them with proper staking. The dwarf varieties do not require much staking.

Irrigation may be required once in a week to ten days. When the plants come into bearing, they should be copiously watered, because this keeps the fruits tender and prevents them from ripening too soon.

Plants come to flower after about eight weeks. Flowering, fruiting and harvesting continue for about six weeks. The yield is increased if the leading shoots are pinched off after the flowers have appeared. Well filled up medium grown pods are to be plucked. The produce is roughly 100 lbs. green pods from a plot of 1,000 sq. ft.

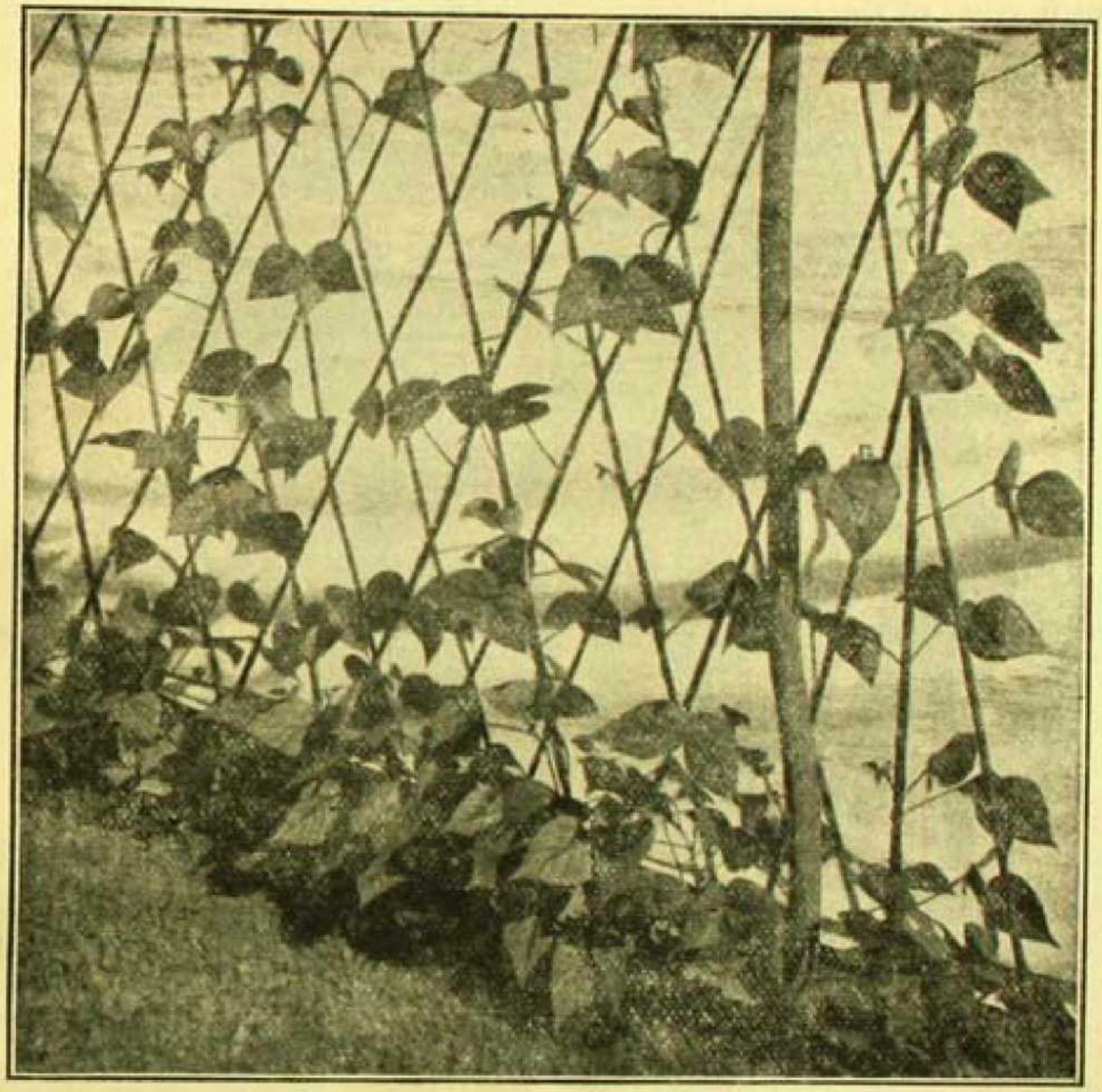
The straw left after the harvest of pods provides a valuable fodder for cattle.

BEANS

There are many varieties of beans, namely, Lima bean (also called Double or Butter bean), Broad bean, French bean, Asparagus bean, Sword bean, Country bean, Velvet bean and Goa bean. The English Broad beans and Runner beans are not successful in Bengal.

For Lima beans the seed-rate comes to about 3 oz. for a plot of about 1,000 sq. feet, for Broad beans about 1 lb. seed for a plot of 100 sq. feet, and for French beans about 1½ lb. for an area of 1,000 sq. feet.

Beans may generally be sown from August to November, French or Kidney and Runner beans being sown from August to October, Lima and Broad beans during October and November, the Sword beans, the Country beans (*Makham Seam*), the Goa beans and the Asparagus beans being sown in the rains (from May to July). Shade is generally advantageous specially to French and Broad beans.



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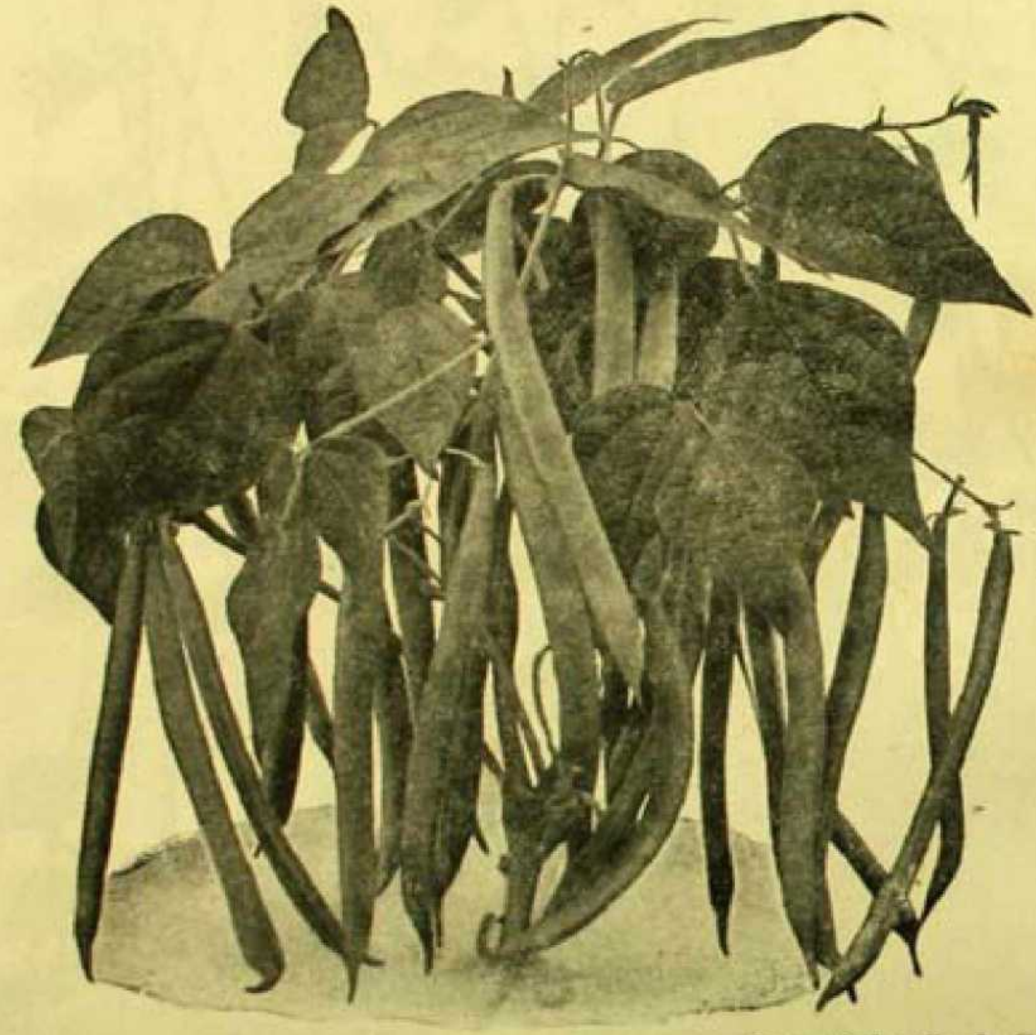
CLIMBING BEANS

Broad beans should be sown 3 inches deep, in rows 2 ½ feet apart, the distance between plant to plant being 15 inches, French beans in rows, 1½ feet apart, and the distance between plants being 1 foot, and the Runner beans in rows, 4 feet apart, with a distance of 1 foot between plants. Country beans, Goa beans, Velvet beans and Asparagus beans should be grown in rows 5 feet apart, the distance between plant to plant being 1 foot, and the Sword beans in rows of the same distance, but with a space of 2 feet between the plants. Germination will generally take place within two weeks.



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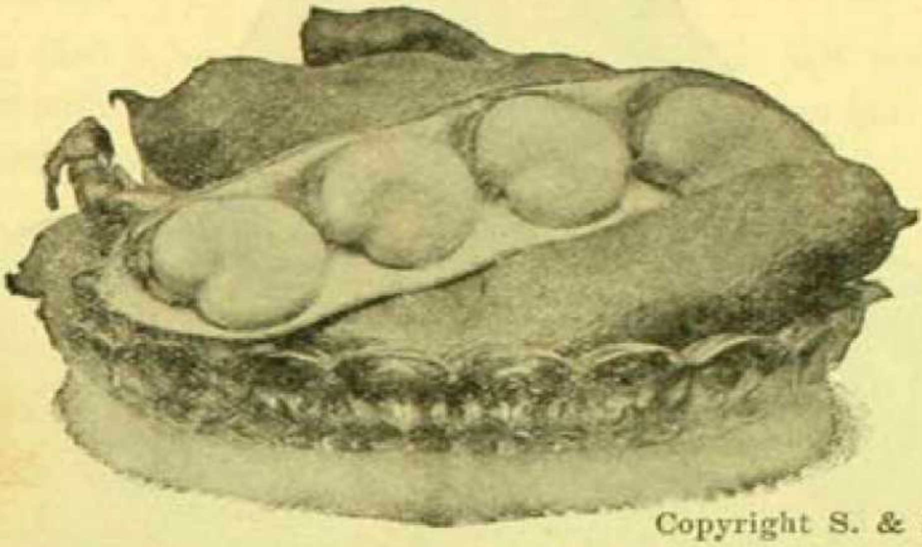
FRENCH BEANS

The climbing beans (The Runner beans, Sword beans, Asparagus beans) should be given supports at the proper time so that the growth of the shoots is properly encouraged. In the case of Broad beans when the plants come to flower, the breaking of the end points of each shoot encourages the proper setting of the flowers into pods. The tips thus tipped off may be used as a vegetable. Irrigations are given after the rains are over.



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BROAD BEANS

Beans are generally ready for harvest within 3 to 4 months. The yield is about 100 to 125 lbs. from an area of 1,000 sq. feet.

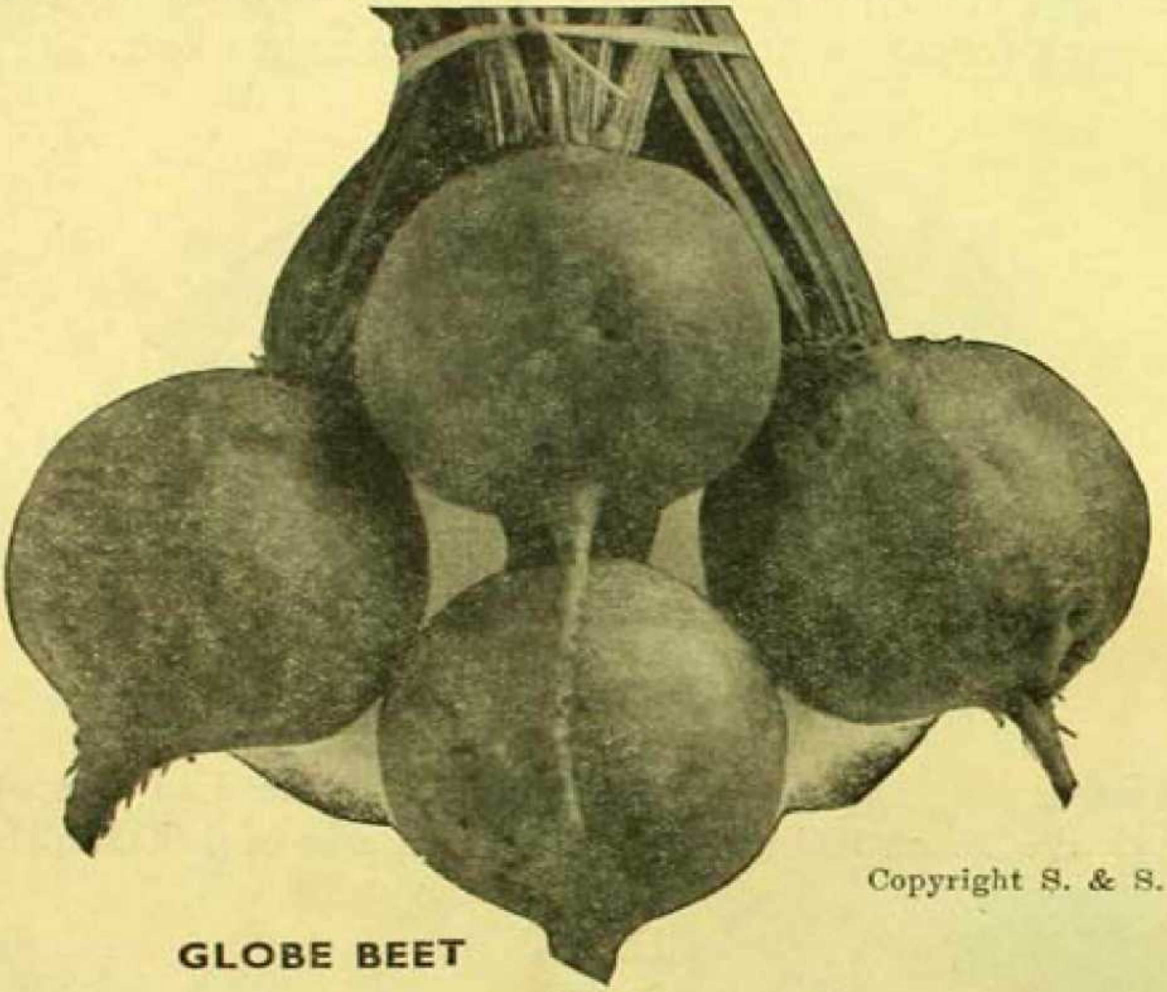
BEET

There are several varieties of beet, but these perhaps vary more in form and colour than in flavour. It is a root crop and requires a deeply-dug and well pulverised soil. On badly prepared soils, or if the manure is close to the surface, the roots will be deformed.

An ounce of seed is sufficient for a row of 100 ft.

It is generally sown from August to November. Seedlings may either be raised first on seed-beds, and transplanted, or seeds sown direct in the ground. Seeds should be sown thinly, so that the seedlings should not show up closer than an inch apart, and these may then be thinned out to 6 to 9 inches between plants. If sown in rows, the rows should be 12 inches apart. The seed usually germinates in 7-10 days.

Watering may be done once in a week, and an application of liquid cow dung manure will benefit the crop.



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GLOBE BEET

LONG BEET

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Beet becomes ready in 2 to 3 months. The yield is about 300-400 lbs. from an area of 1,000 sq. feet.

RADISH

There are three principal kinds of radish, the long shaped, the oval shaped and the turnip shaped. There are also red and white varieties.

It is also a root crop and requires a deeply dug and well pulverised soil, free from all lumps of earth and manure. A partially shaded situation is advantageous.

Two to three ounces of seed will be sufficient for a row of 100 feet.

Seeds may be sown at intervals from July to January. The sowing may be broadcast, but it is more economical to sow in drills 6 inches apart. Seeds should be sown quarter of an inch deep. After sowing, the ground should be well compressed, as otherwise the roots will not be well-formed. Seed usually germinates within 8 to 10 days. Seedlings should be thinned out to 3 to 4 inches apart.

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TYPES OF RADISHES

Radish requires constant weedings. Too much watering and applications of fresh manures cause forking of the roots.

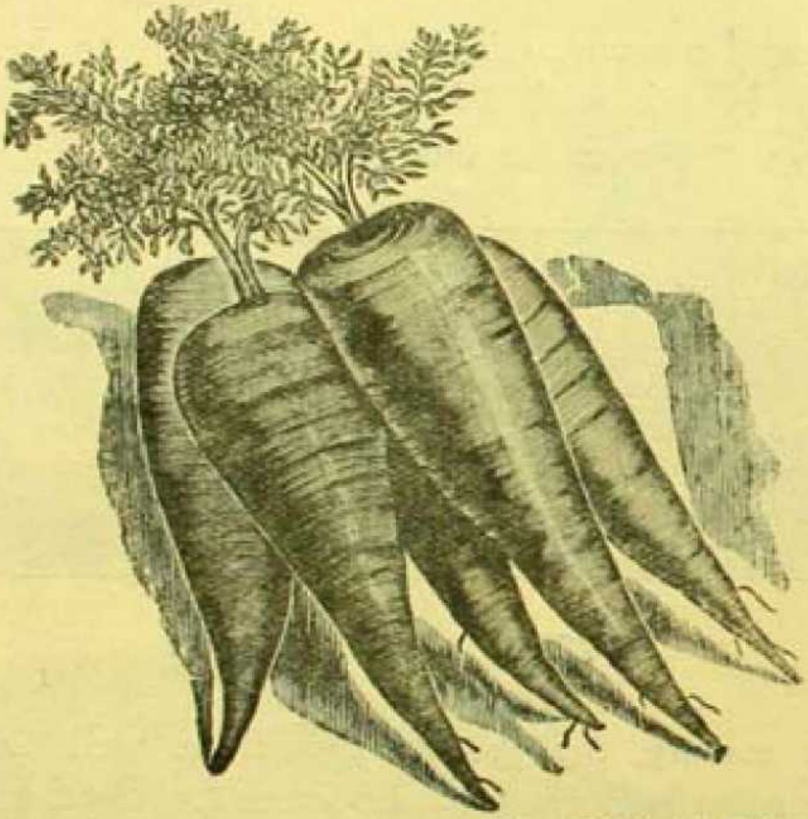
The crop becomes ready for harvesting in about 4 to 6 weeks. The roots become pithy and unfit for use when they attain full maturity. The yield is about 250 lbs. from an area of 1,000 sq. feet.

CARROT

There are usually three kinds of carrot, the long, the short and the blunt-shaped.

Carrot is also a root crop, and the soil should therefore be deeply dug and well-pulverised. Carrots should also not be sown on recently manured land, because the roots coming into contact with the raw manure become mis-shapen.

Half an ounce of seed will be sufficient to sow a row of 100 feet in length.



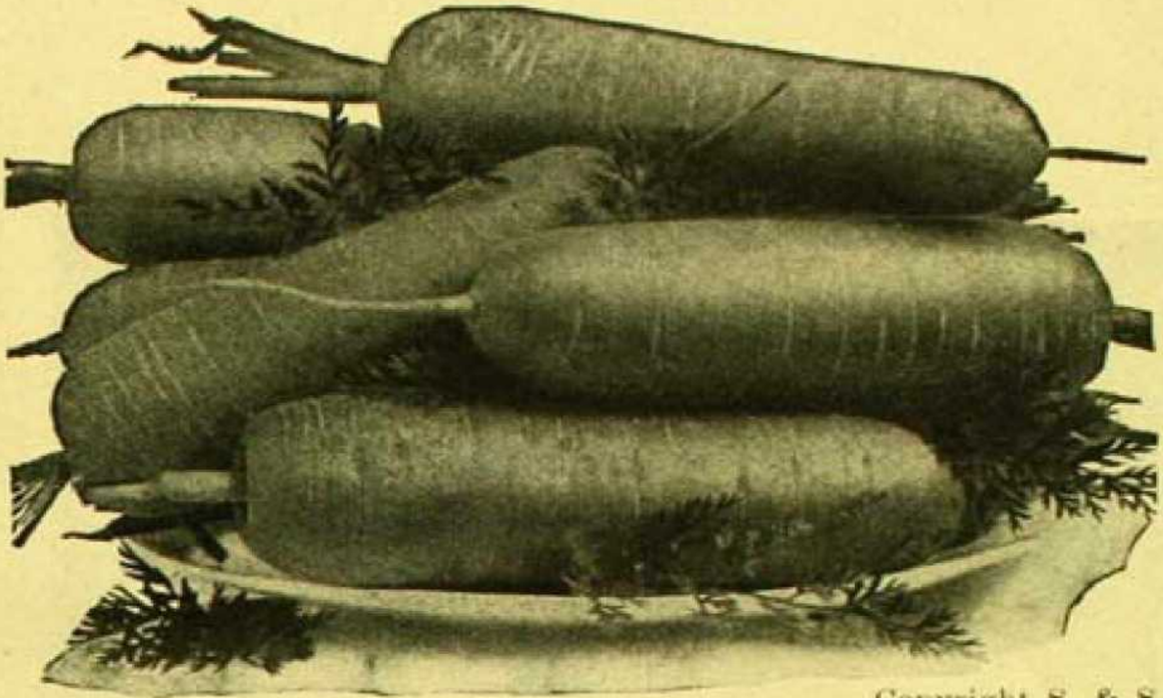
The Globe Nursery.

CARROT

The period of sowing is usually from September to November. Seeds should be sown in drills, 12 inches apart, and seedlings should be thinned out to 4 to 6 inches between plants.

It becomes ready for harvest in about 2½ to 3 months. Well-grown but tender roots should be pulled up. Roots are liable to split if kept too long in the ground. The yield is about 250-300 lbs. from an area of 1,000 sq. feet.

CARROTS



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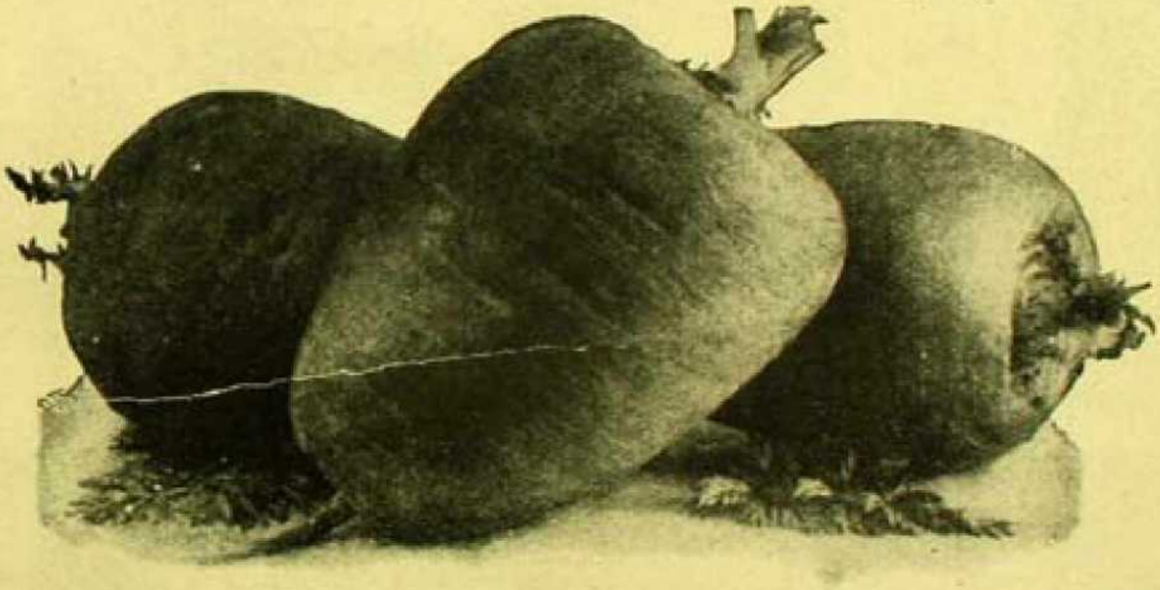

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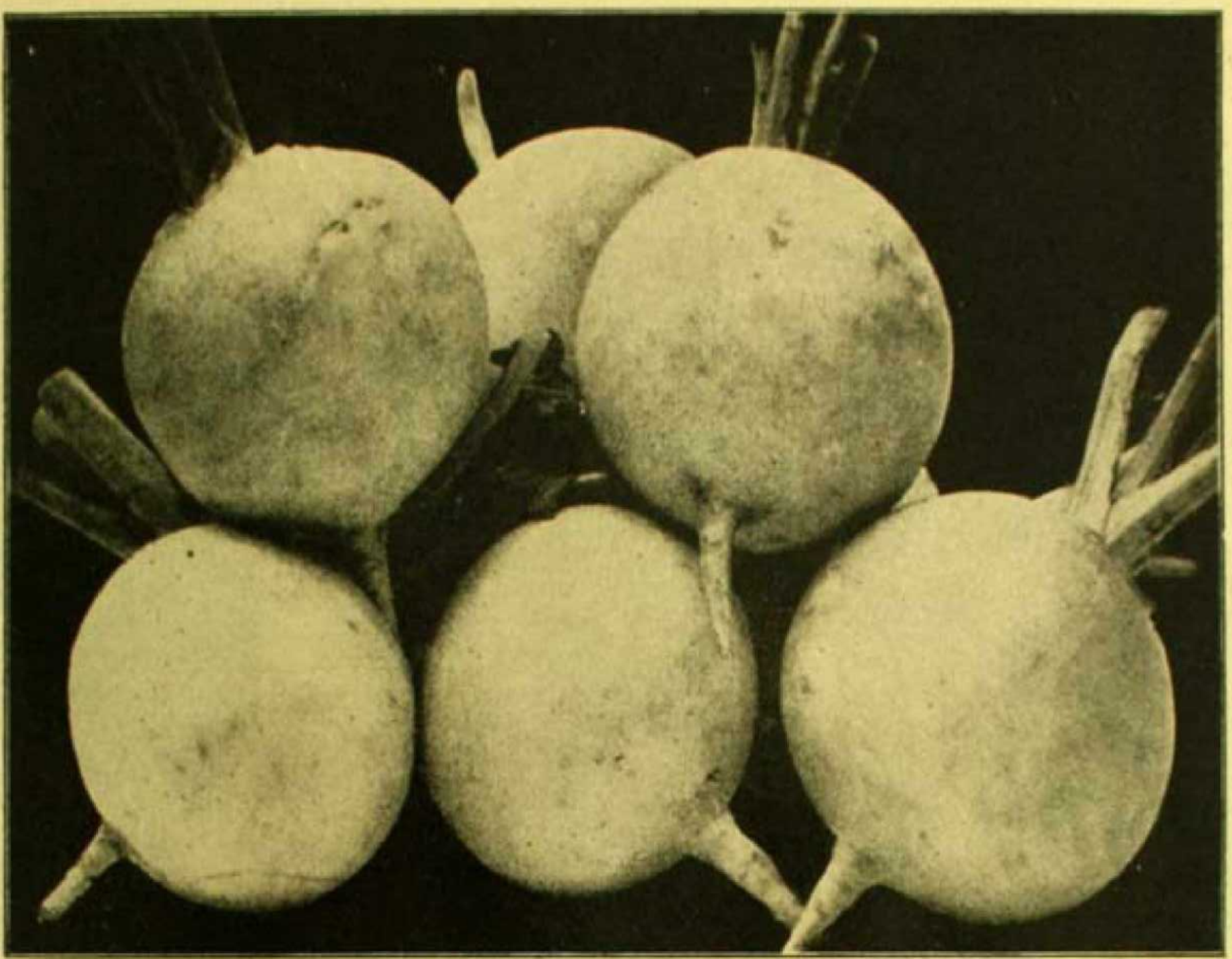

EARLY SNOWBALL TURNIP

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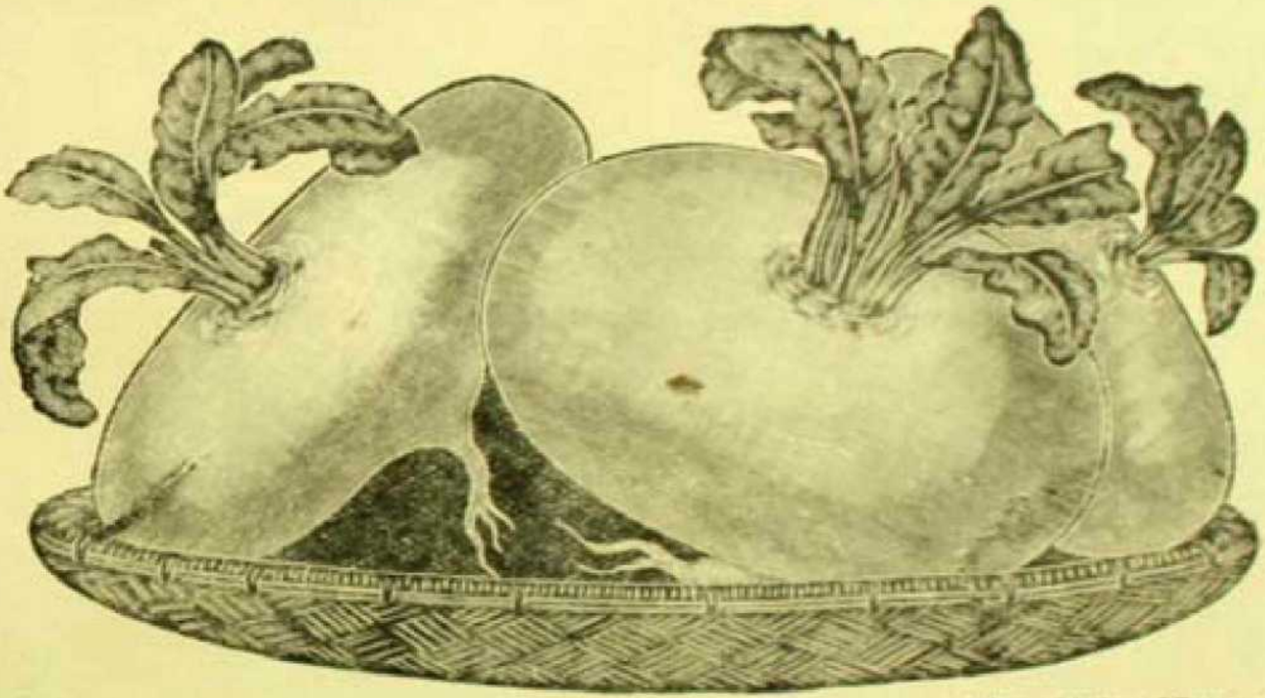
TURNIP

There are several varieties of turnip. The red variety is early, while the white variety is late.

This is also a root crop, and requires a well-prepared and well-pulverised soil in an open situation.

Half an ounce of seed will be sufficient to sow a row of 100 feet.

Seeds may be sown from September to December. Seeds may be dibbled, half an inch deep, in rows 12 inches apart. If the seeds are sown broadcast, these should be mixed with four times their bulk of dry sand to secure evenness of sowing. Seed usually germinates within 10 to 14 days.



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TURNIP

Crowding of plants should be avoided, as in that case roots do not form properly. Cultural instructions are about the same as for beet and carrot.

During dry weather plenty of moisture must be made available to the plants. Turnips grown with insufficient water become exceedingly strong in flavour, and if growth is checked by drought, the roots become stringy and tough.

It takes about 6 to 8 weeks for the crop to be ready for the table. The produce is generally 400 lbs. per 1,000 sq. feet.

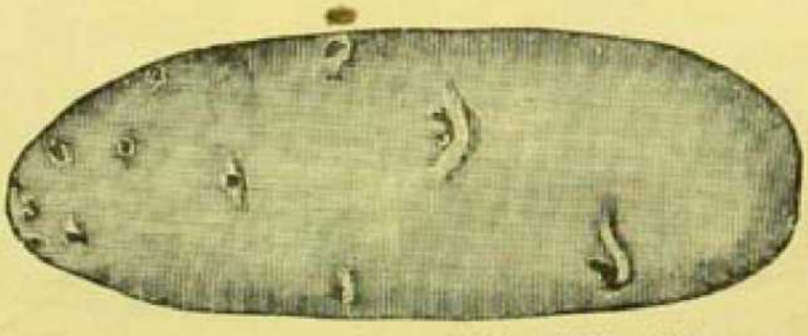
POTATO

This is undoubtedly the most valuable edible tuber, and among vegetables the most generally consumed. There are also some popular varieties, the chief of them being, Darjeeling and Nainital, Katwa or Katni, etc.

Well-drained sandy loam is the most suitable for potatoes.

About 6 to 10 seers of tubers are required for planting a plot of 1,000 sq. feet.

Planting period is generally from the middle of October to the middle of November. Tubers are planted in rows, 2 feet apart, either whole or cut, according to their size, being laid 3 inches below the surface, with a space of 9 inches between each. When whole tubers are used, the best tubers for planting are the medium sized ones i.e. those that are about 2 inches in diameter. The tubers when cut into sets should be such that each set has at least two eyes. In planting, furrows are opened 12 inches to 15 inches apart, depth being 3 to 4 inches. Manures are spread on the furrows and thoroughly mixed with the soil, and then the sets are planted in them, the buds facing upwards. After planting, the sets should



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POTATO

A PLOT OF CABBAGE

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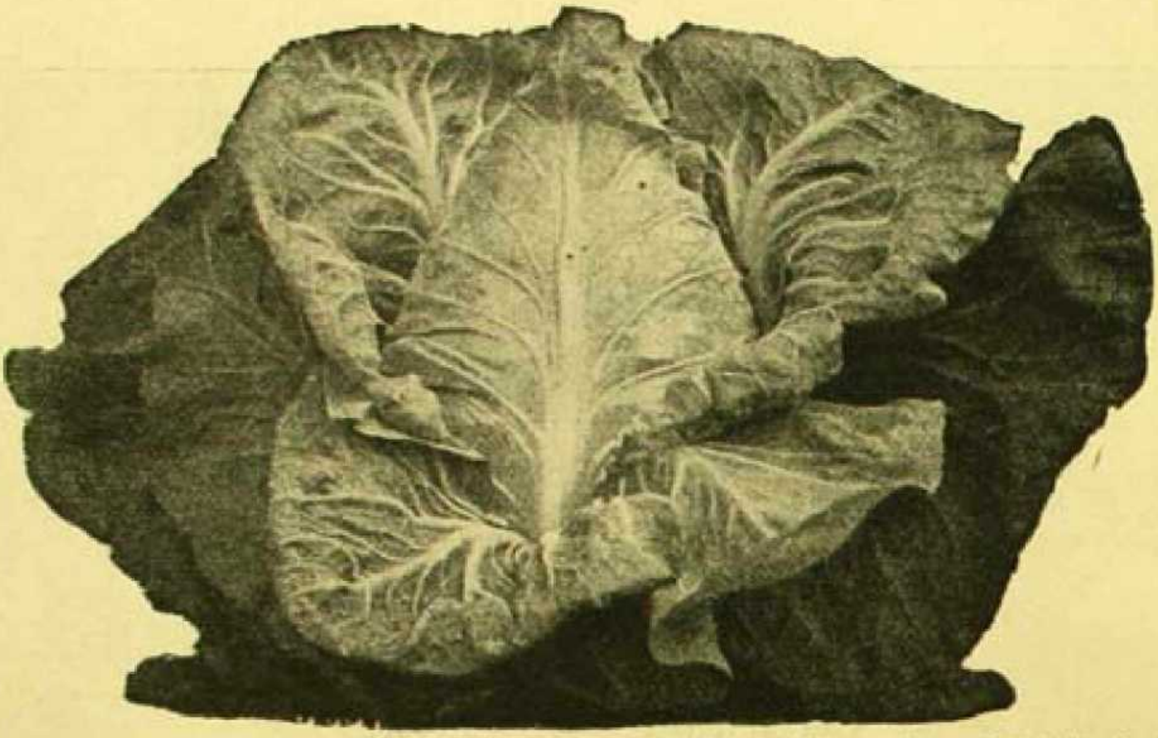
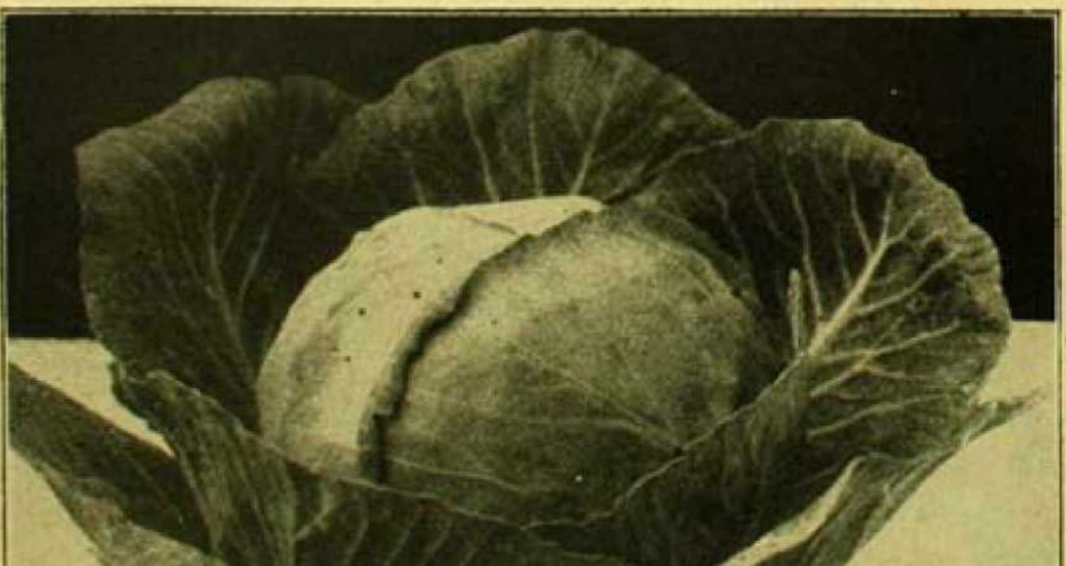


CONICAL CABBAGE Copyright S. & S.



BULLHEAD CABBAGE Copyright S. & S.

be earthed up, and water given in the new furrows made between the earthed up lines when the plants are about 6 inches high.

The crop requires good cultivation, irrigation, and heavy manuring. A minimum dressing should be about 5 maunds of cow-dung and 10 seers of castor cake per 1,000 sq. feet plot. Where possible, water-hyacinth compost may replace cow-dung, or an additional dose of 10 seers of water-hyacinth ash may be given, as the crop is a potash lover. Want of cow-dung may also be made up by green-manuring with sunnhemp. Castor cake is not only a valuable manure, but prevents white ants and red ants from attacking the planted tubers.

Three to four irrigations are necessary depending upon the season. After each watering, the soil should be well-loosened. As the plants grow, they are earthed up to encourage root development, and a good crop depends on this being carefully done. Adequate hoeings to conserve moisture and destroy weeds, insects, etc. are also a great factor in increasing the yield.

The crop becomes ready for harvest within 3 to 3 ½ months, when the stems begin to wither and the leaves dry up. Potatoes should be lifted with a '*Kodali,*' care being taken not to damage the tubers; as damaged tubers are liable to become diseased and infect the sound ones.

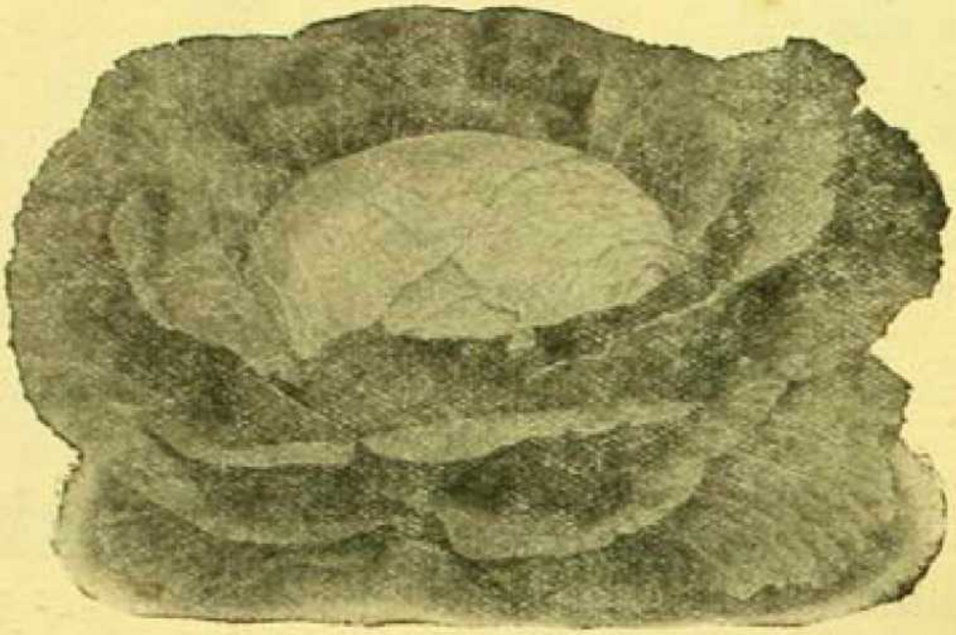
A well-grown crop will yield on average 6 to 7 maunds from a plot of 1,000 sq. feet.

CABBAGE

There are numerous varieties of cabbage.

One ounce of seed will provide 1,000 plants.

Seed is sown in seed-beds towards the end of the rains, and sowings may continue from August to December to get successive crops. Seeds usually germinate within 5 to 10 days. When the seedlings are 4 inches in height, they are transplanted in rows, 2 feet apart, the distance between two plants in a row being also 2 feet. Early sowings are liable to be affected by heavy rains, and therefore planting should be done on ridges.



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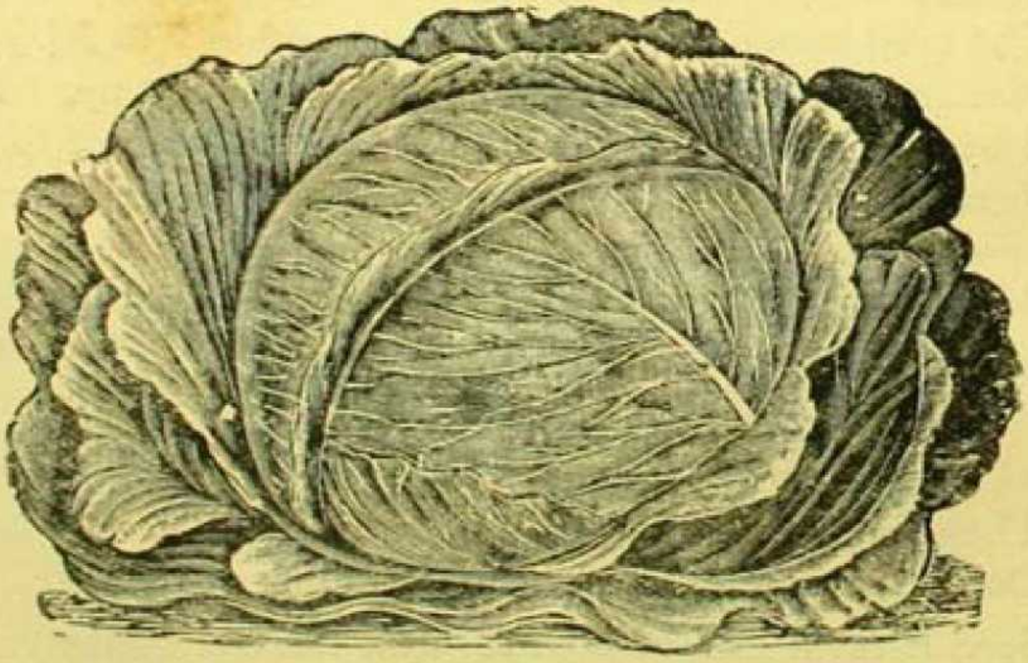
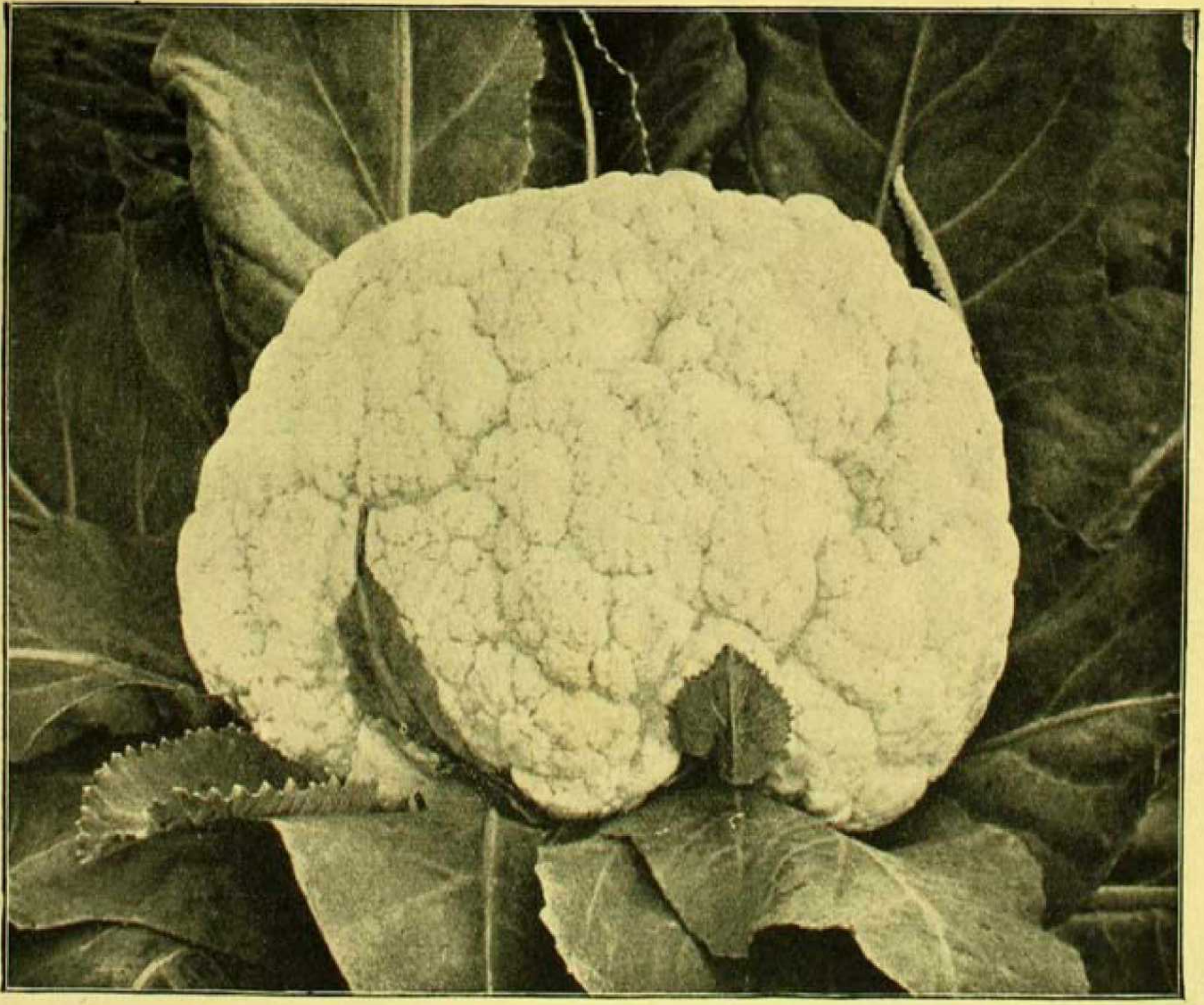
DRUMHEAD CABBAGE



CABBAGE The Globe Nursery.

Irrigations will depend upon the moisture in the soil. Weeding and hoeing should follow each irrigation as far as possible.



SNOWBALL CAULIFLOWER

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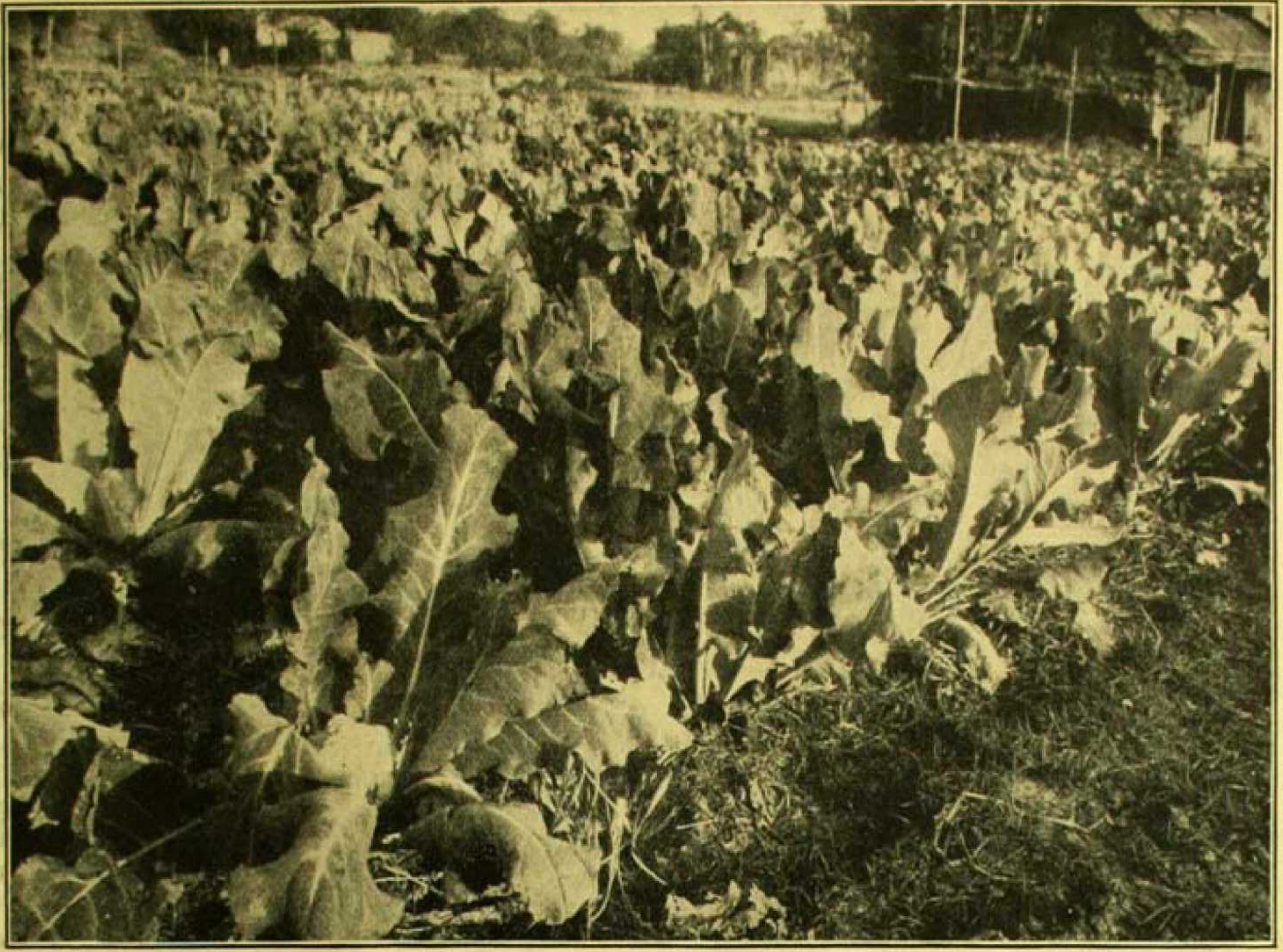
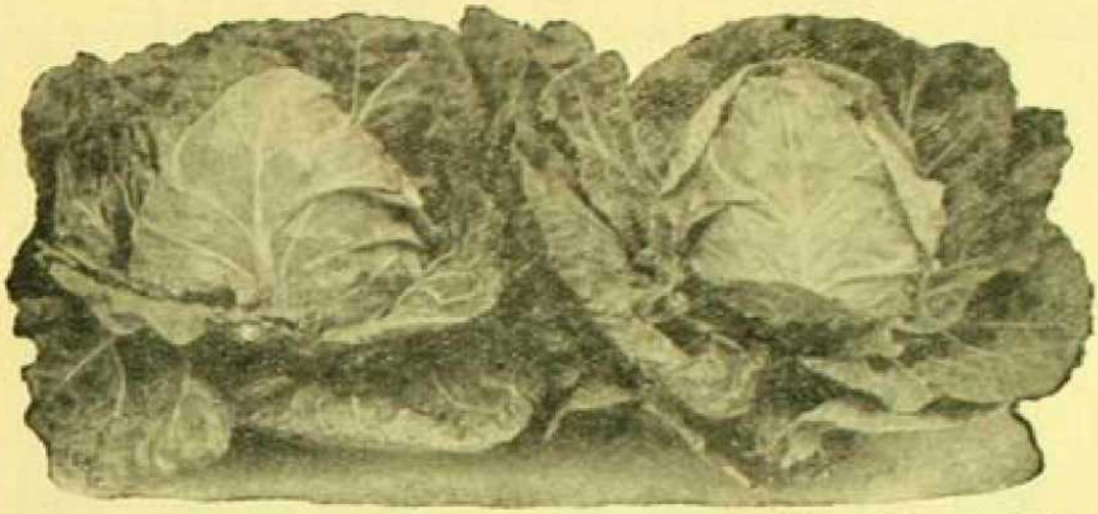


A PLOT OF CAULIFLOWER

Bengal Agricultural Dept.

When the plants have developed foliage, earthing up of the base is essential to ensure good results. Irrigation may be done in the furrows thus made. Old leaves should be removed frequently.



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CABBAGE

Cabbages are ready in 3 to 4 months, and give a yield of about 500-750 lbs. from a plot of 1,000 sq. feet.

CAULIFLOWER

There are many varieties; Patna variety is suited for early sowings, as it can stand rains much better than the imported seeds.

One ounce of seed will provide 1,000 plants.

Seed is sown in seed-beds from July to November. It is essential for this crop to transplant the seedlings twice before they are planted in the open ground. Its cultivation is just the same as for cabbage. When the flower head appears, it may be shaded with the leaves of the plant to keep the curd white.

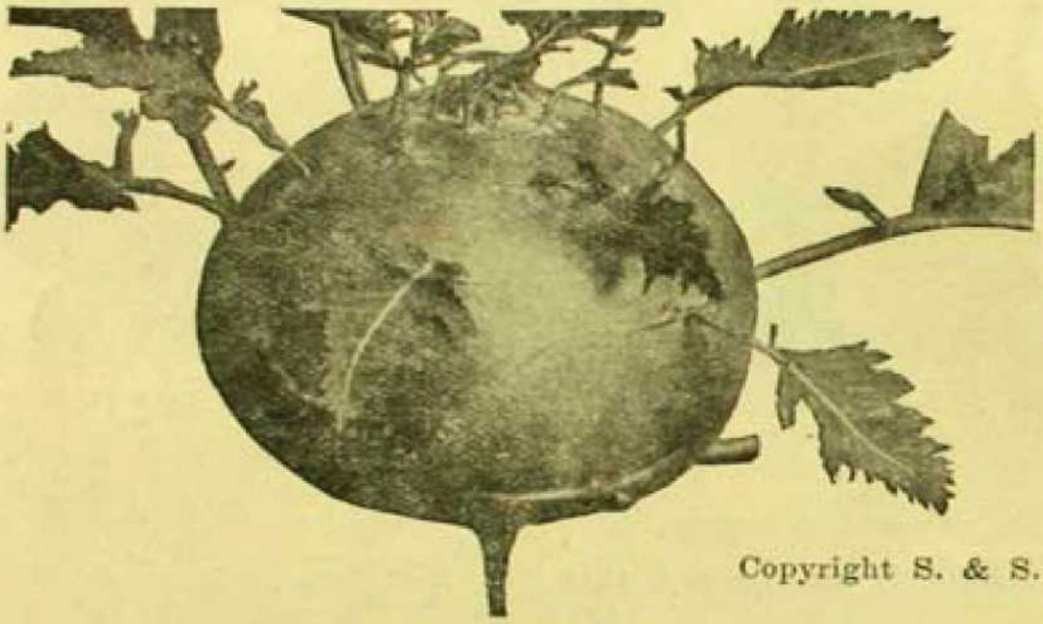
Cauliflowers get ready in 3 to 4 months, and the average out-turn of a medium crop is about 5 to 6 maunds of heads from an area of 1,000 sq. feet.

KNOL KHOL OR KOHL RABI

Green and purple varieties differing little in quality are cultivated. The swollen succulent stems of the vegetable are eaten.

One ounce of seed will provide 1000 plants.

Seed is sown in seed-beds from September to November, and when the seedlings are large enough, they are transplanted 1 foot apart. The plants should be watered freely, and the roots should not be earthed up. For cultivation, the same directions apply as for cabbage except that the plants may be put out somewhat nearer to one another.



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KNOL KHOL

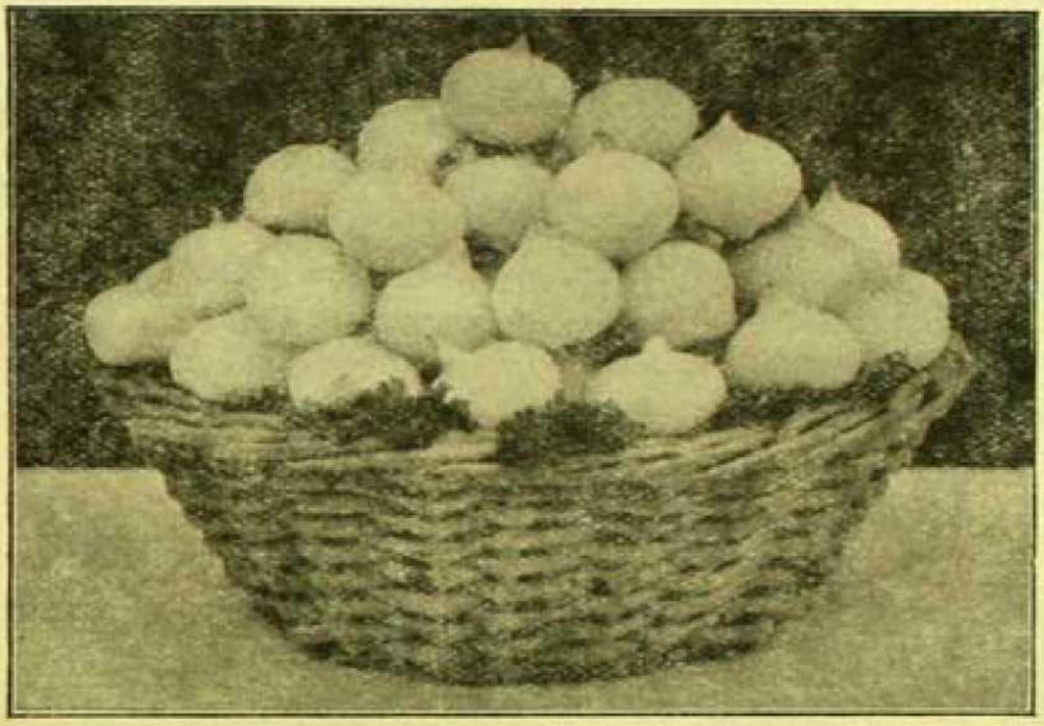
It takes about six weeks to two months to be ready for harvest. The yield is about 3 to 5 maunds from an area of 1,000 sq. feet.

ONION

There are local races, one commonly grown is the large red onion. Patna variety is the best. A light sandy soil is the most suitable for it. The soil must be pressed down to make a firm bed.

About half an ounce of seed will be sufficient to sow a 100 feet row.

Seedlings may either be raised in seed-beds and then transplanted, or seeds sown direct in the ground, and seedlings thinned out later. Sowings may continue from September to November. Seed takes about 2 to 3 weeks to germinate. Seedlings should be thinned out to 4 to 6 inches apart. Transplanting may be done when seedlings are 6 inches high, in lines, 9 inches apart. Irrigations should be given when necessary. Stirring of the soil should be done after each irrigation.



ONION Copyright S. & S.

Pickling onions are a smaller variety, and should be sown closer i.e., about 3 to 4 inches apart each way.

When the leaves have completely withered, the bulbs are ready to be taken out. The average yield is about 300 lbs. from a plot of 1,000 sq. feet.

For seed purposes, bulbs should be planted in rows, 18 inches apart, and 1 foot from each other. Only sound well-shaped bulbs should be selected. The tops should be cut off with a sharp knife, and the lower two-thirds should be taken for planting; this gives stronger flower shoots.

SPINACH

It provides a very wholesome vegetable. It requires a shady situation.

One ounce of seed will be enough for a row of 100 feet.

Seeds should be sown in drills from September to December, and thinned out to about 6 inches apart. The rows should be 12 to 18 inches apart. Seeds take about 2 to 3 weeks to germinate.

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SPINACH

The plant takes about 6 to 8 weeks to mature.

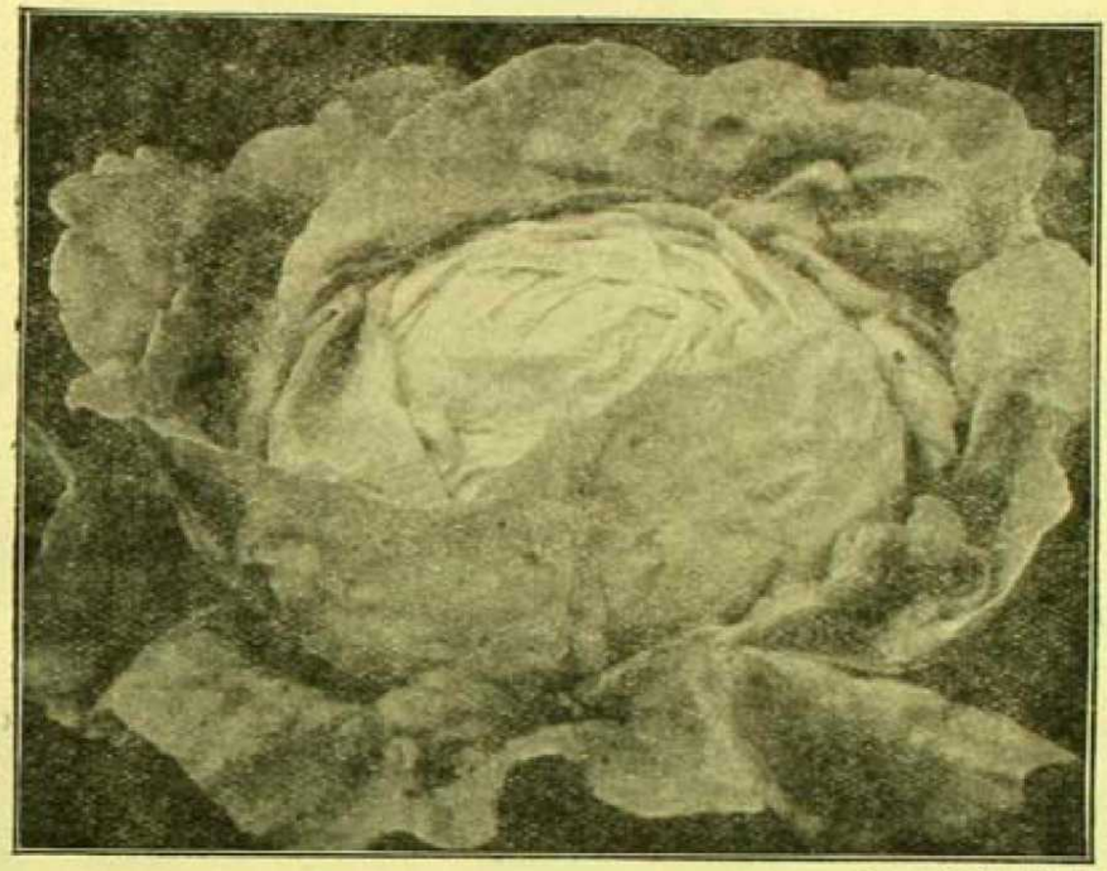
LETTUCE

There are two kinds of lettuce, namely, (1) The Cabbage-like lettuce and (2) the Cos lettuce, and each has a number of sub-varieties. The Cos type is long and upright.

One ounce of seed will provide 1,000 plants.

Seeds are generally sown from September to December. Seedlings may be transplanted in rows, 1 to 1 ½ feet apart, the distance from plant to plant being 1 foot. Early lettuce should be planted on ridges, 8 to 10 inches high, and will do in the rains. When sown direct in the ground, the seedlings should be thinned out properly. The most delicate leaves are generally obtained from those which have not been transplanted. Plants of the Cos varieties may be assisted to form heart by tying the outer leaves loosely together. Frequent waterings are essential. Slight shade is advantageous to the crop.

The harvesting period extends till March.



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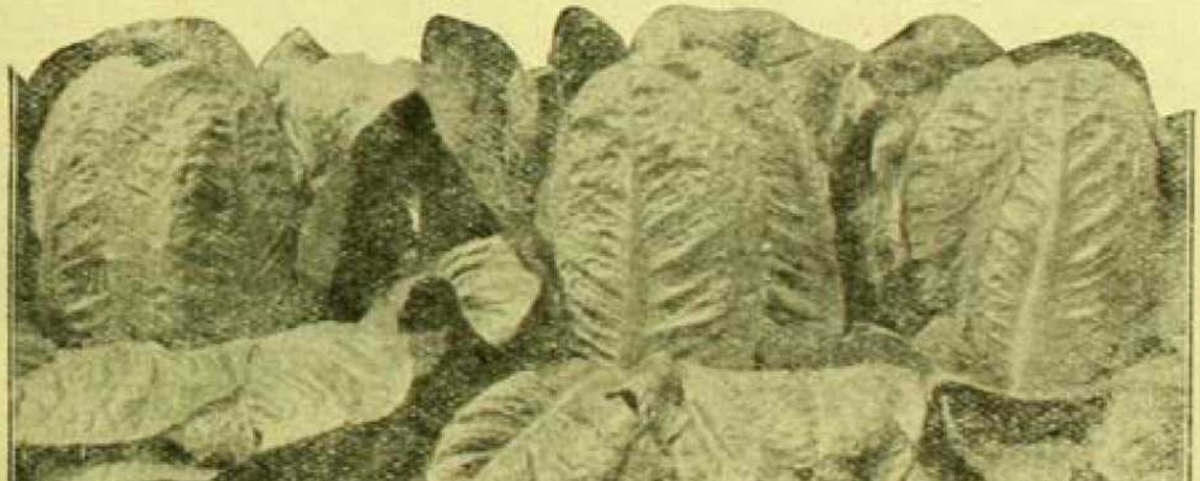
CABBAGE LETTUCE



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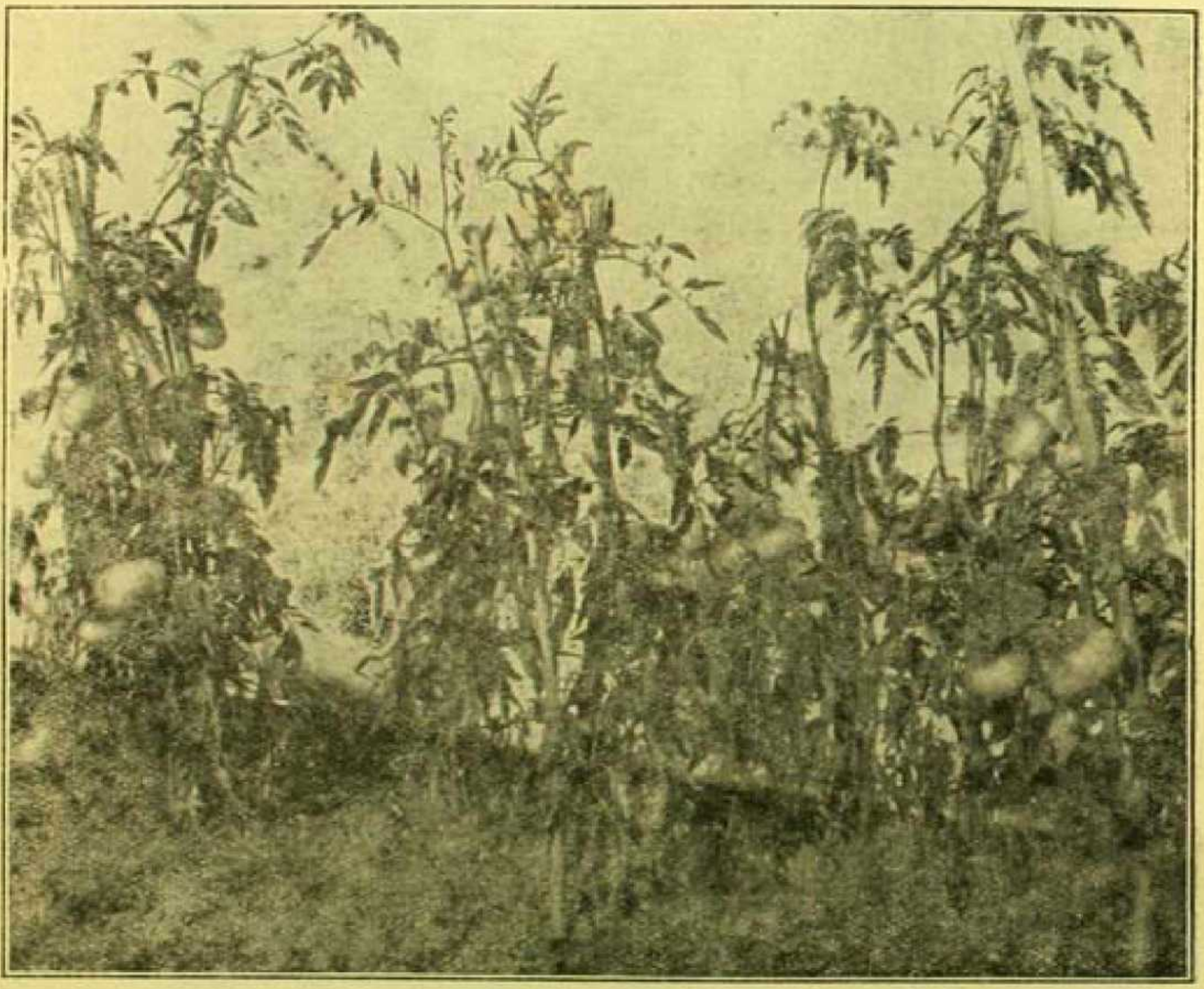
COS LETTUCE

TOMATO

There are many varieties. Tomatoes should be grown in an open situation, as light and air are essential for the formation of of sound fruits.

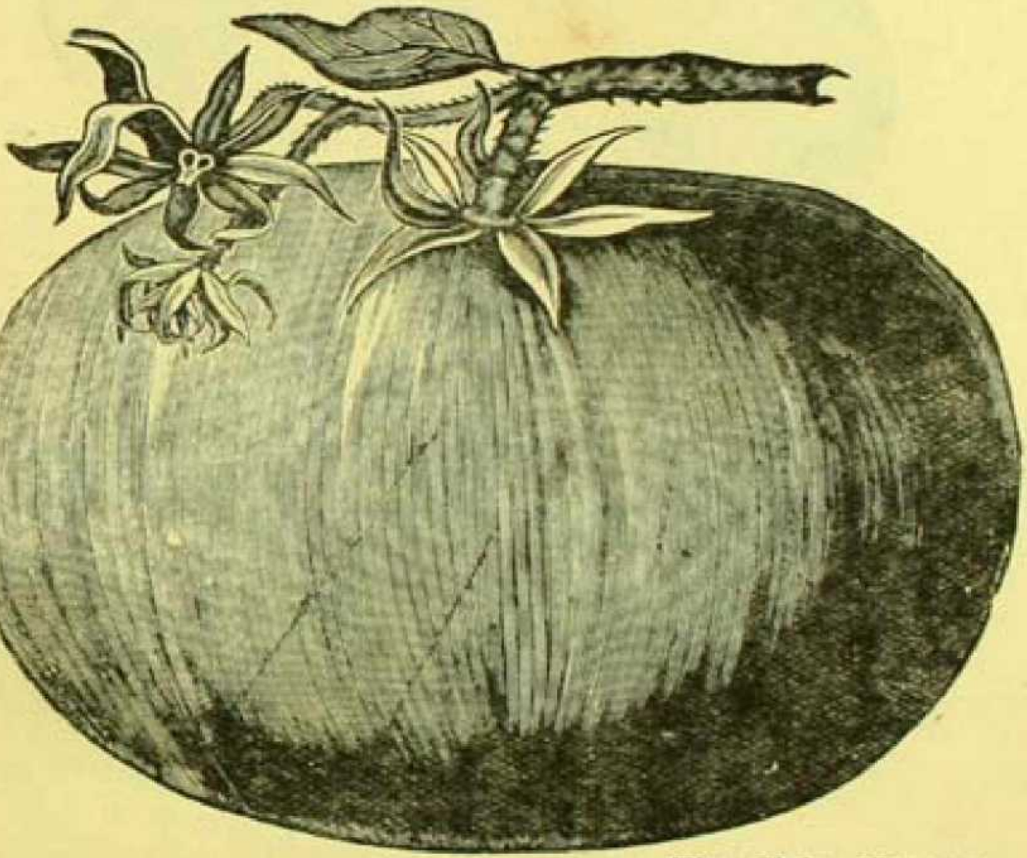


Bengal Agricultural Dept.

A TOMATO CROP

Half an ounce of seed is enough for a row of 300 feet.
Seeds are generally sown in seed-beds from July to December.

The seedlings should be transplanted in rows, 2 ½ to 3 feet apart, and 1½ to 2 feet, between plants. These may also be planted on ridges. The plants must have supports as they grow, and specially when they come into fruit. Side shoots and those showing at the axils of the leaves should be removed. The fruits may also be thinned out if the plant seems overladen with them. Irrigation is required if there is no rain. Earthing up should be done before flowering.



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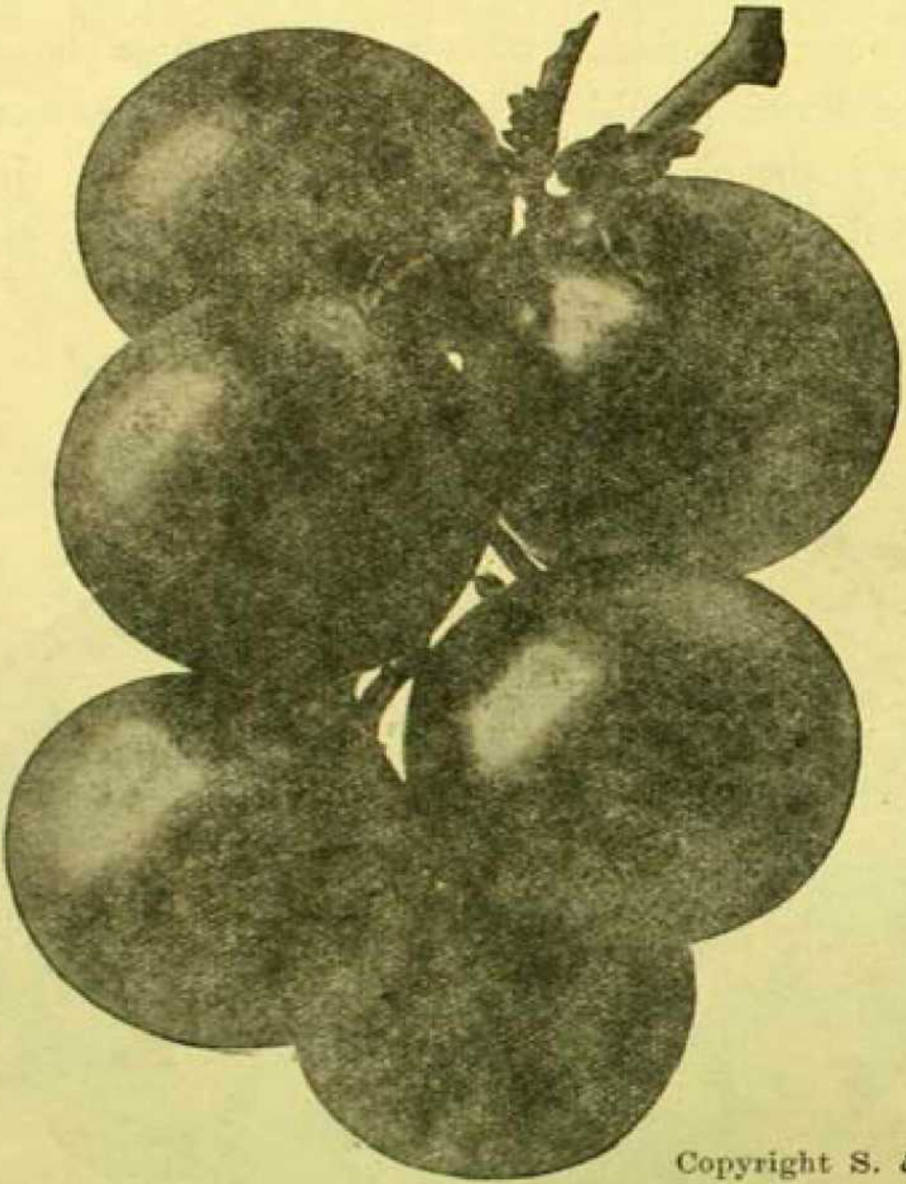
TOMATO

The crop becomes ready for harvest in 3 to 4 months. Fruits which change colour from green to red should be harvested. They should not be allowed to ripen completely on the plant, because if allowed to do so, they get spoilt by birds or at the time of handling.

The yield is about 200 lbs. from a plot of 1,000 sq. feet.



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TOMATO

On a field scale 250 maunds per acre of ripe tomatoes can be taken as an average out-turn, though a good crop yields more.

CHAPTER IV

SOME ENGLISH VEGETABLES

(Not so commonly grown)

GLOBE ARTICHOKE

It is propagated by seeds, but can also be propagated by suckers.

Artichoke requires a very rich soil and also abundant watering. Surface soil should be kept constantly stirred.

Seeds are sown in seed-beds from July to November, and when the seedlings are about 4 to 5 inches high, they should be transplanted into trenches, deeply dug and well-manured, at 3 to 4 feet apart.

It is ready for harvest in 5 to 6 months.

JERUSALEM ARTICHOKE

It prefers a light deep soil. The soil should be well dug, well manured and well pulverised.

It is propagated by tubers which are generally planted in March-April, about 2 feet apart, in rows, 3 feet apart. The whole tuber may be planted, or cut like potatoes. The plants grow to a height of about 3 to 4 feet. The soil between the rows should be kept well-hoed and free from weeds.

Flowers should not be allowed to appear, as these reduce the size of the tubers. It is therefore a good plan to nip off about 6 inches of the tops as the buds begin to appear.

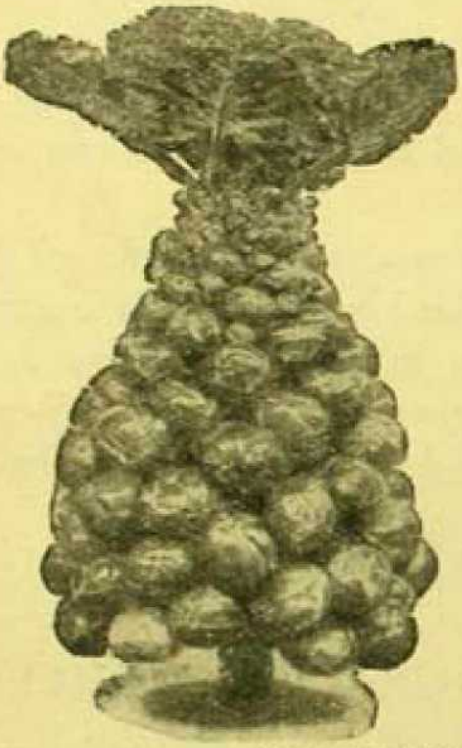
The crop is ready for harvest when the tops begin to die back in November-December. The tubers wilt in dry weather, and it is best to leave them in the ground until required for use.

BRUSSELS SPROUTS

Seeds are generally sown in seed-beds from August to December.

One ounce of seed will produce about 1,500 plants.

Seedlings should be transplanted about 2 feet apart in lines, and require earthing up as they grow, and also a liberal supply of water. Its cultivation is similar to that of cabbage.



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Brussels Sprouts

The sprouts are gathered before the head is cut. The lowest sprouts should be gathered first.

A well-grown plant will produce 50 to 100 sprouts.

CELERY

This vegetable is of two kinds, white and red, with several varieties under each. Seeds are sown in seed-beds from July to September. Earliest sowings are the best, because the plant takes a long time to complete its growth. The seed also takes a long time to germinate—sometimes a month to a month and a half.

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Turnip-Rooted Celery, or Celeriac

CELERY Copyright S. & S.

One ounce of seed will produce about 2,500 to 3,000 plants. When the seedlings are large enough, they are transplanted into trenches very highly manured with a large quantity of farmyard manure and leaf-mould mixed with some sand, to a depth of a foot or more. On this, a few inches of a good loamy soil is placed and firmed down. Seedlings are placed on this, one foot apart. They should be kept frequently watered.

Foliage is tied into a loose heart, and the soil carefully hoed up around the stalk as the plant grows. Straw envelopes may be tied round each plant to blanch the foliage. Great care should be taken in watering to see that no water collects in the hearts of the plants, or else rotting will start.

The harvesting period is from January to March.

Of all vegetables, it is with celery that the amateur appears to have the least success, because of the erratic germination of the seeds. The essential condition for successful germination is cool weather, the most favourable time for sowing (under cover) being at the beginning of a long cool spell of rainy weather.

CRESS

Seeds are broadcast once a fortnight from September to February, and leaves are cut for salad after a few days of sowing. It can be grown all the year round.

It requires a light and rich soil, and adequate watering.

LEEK

Seeds should be sown in seed-beds from September to November, and when the seedlings are about 4 to 6 inches high, they should be transplanted into narrow trenches, 15 inches apart, distance between the plants being 6 to 9 inches. Seeds may also be sown direct in the soil, half an inch deep, and seedlings thinned out to 6 to 9 inches apart. The plants should be earthed up gradually an inch every ten days, when the plants are two months old. Trim tips of leaves two to three times to make the stem swell.

It becomes ready in 3 to 6 months.

PARSLEY

It thrives in any soil in a shady situation.

Seeds are sown in seed-beds from August to November, and when the seedlings are 3 to 4 inches high, they may be planted out in rows, about 6 to 9 inches apart, and kept well-watered. Seeds may also be broadcast and seedlings thinned out.

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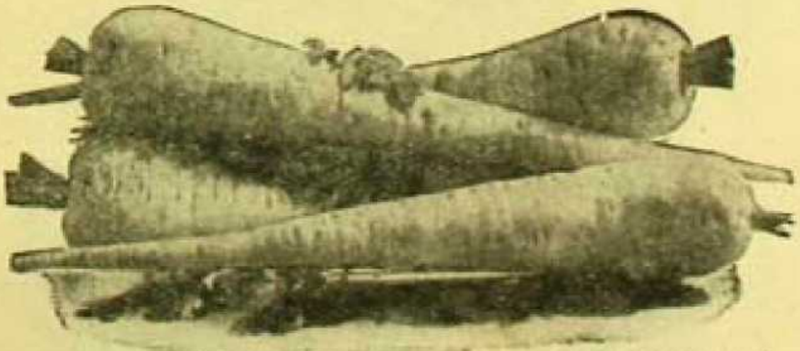
PARSLEY

It becomes ready in 1 to 3 months.

PARSNIP

Seeds should be sown in drills, 18 inches apart, in October-November, and seedlings thinned out to 9 inches apart. The crop requires a light and rich soil deeply dug, so that the root is able to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PARSNIP

penetrate it easily. The soil should be frequently watered. Its cultivation is similar to that of turnip.

The crop attains maturity in 5 months, but those roots which are about two-thirds grown are the best for table use.

SORREL

Seeds are broadcast in September-November, and seedlings thinned out to 9 inches apart.

It becomes ready to be cut within two months.

CHAPTER V

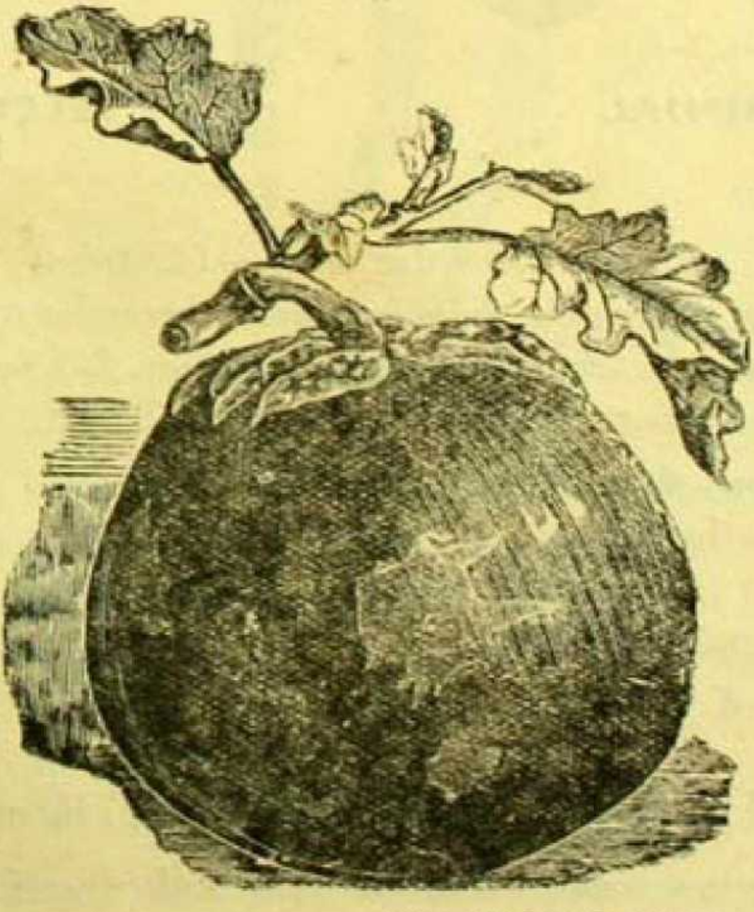
SOME COMMON COUNTRY VEGETABLES:

SHORT NOTES ON THEIR CULTIVATION:

Country vegetables are chiefly cultivated during the summer and the rains, when imported winter vegetables cannot be procured. Seeds sown in the summer are usually soaked in water, and then forced to sprout by being kept in a damp cloth. When they sprout, they are sown. This applies particularly to the Gourd family. The Indian 'malis' are well-acquainted with the cultivation of these vegetables.

BRINJAL (*Begun*)

There are many varieties different in size, shape and colour of the fruit.



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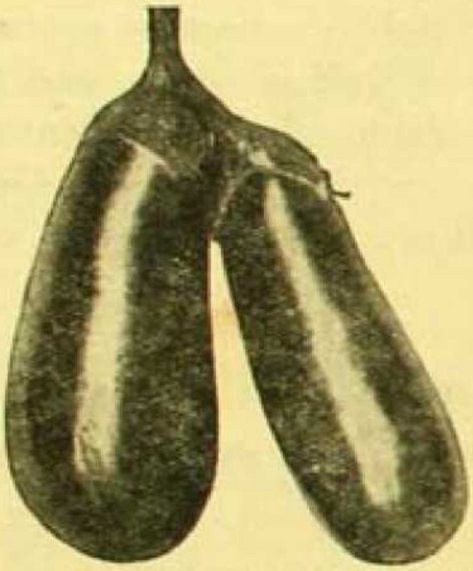
BRINJAL

Seed-rate is about ¼ oz. for an area of 1,000 sq. feet, and seeds are sown in seed-beds four to five weeks before the actual time of transplanting. It is generally grown three times in the year, in the early summer (February-March), during the rains (May-June) and also after the rains—(October-November), and for this reason the vegetable is in season throughout the year. The seedlings should be transplanted on to ridges, 2-3 feet apart, the distance between plants being 18 inches to 2 feet.



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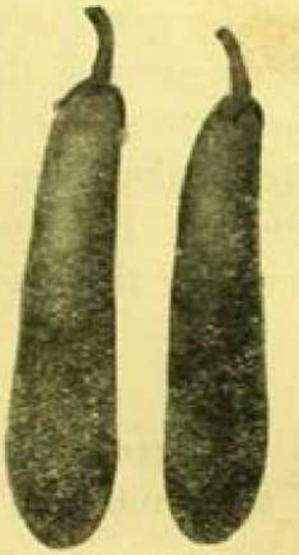
BRINJAL



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SELECTED LONG PURPLE

Irrigations should be given when required. Excess of water is harmful to the crop.

Fruiting starts after about 12 weeks. Well-developed fruits should be collected. The yield is about 200 to 300 lbs. of fruits from a plot of 1,000 sq. feet.

LADY'S FINGER (*Bhendi, Dhenras*)

There are several kinds of tall and dwarf varieties. The dwarf kinds are the earliest.

About 2 oz. of seed will sow about 100 feet of drill. Seeds may be sown direct in the ground from the middle of April to the middle of June. With proper irrigations, it may also be sown earlier i.e. in February-March. Plants should be 2 to 3 feet apart.

During dry months, irrigations are necessary. Proper weedings and interculture should also be carried out.

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LADY'S FINGER

Harvesting commences after six to seven weeks from sowing. The pods should be plucked when they are young and soft, as otherwise, they become too stringy for table use. Pods allowed to ripen in a few plants will provide sufficient seed for the next year.

The yield is 100 to 150 lbs. from a plot of 1,000 sq. feet.

CHILLIES (*Marich, Lanka*)

There are many varieties; smaller varieties are generally very pungent.

About half an ounce of seed will suffice for a plot of 1,000 sq. feet. Seeds are generally sown in seed-beds from the middle of April to the middle of July, and seedlings, when 6 inches high, are transplanted on to ridges, 2 feet apart, and 1½ feet, between plants.

Harvesting takes place from the middle of December to the middle of March. Green chillies may, however, be had from September-October. The yield of dry chillies is about 40-60 lbs. from a plot 1,000 sq. feet, and 150 lbs. green fruits from the same area.

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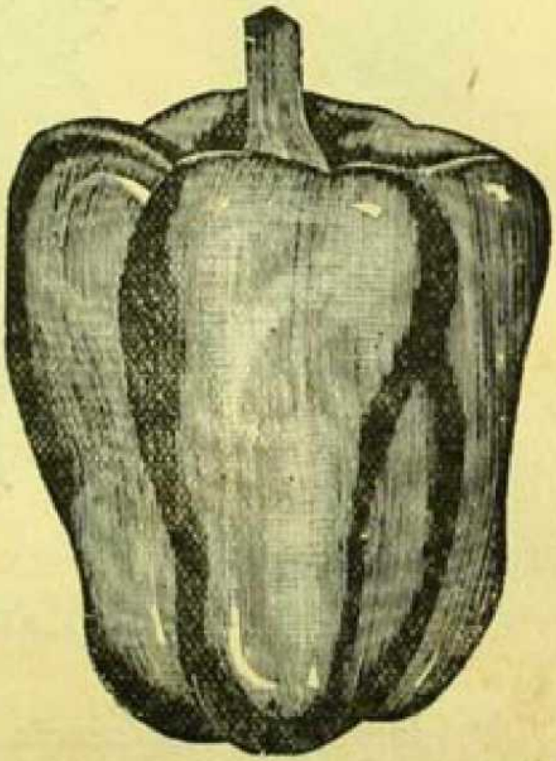
CASPSICUMS AND CHILLIES



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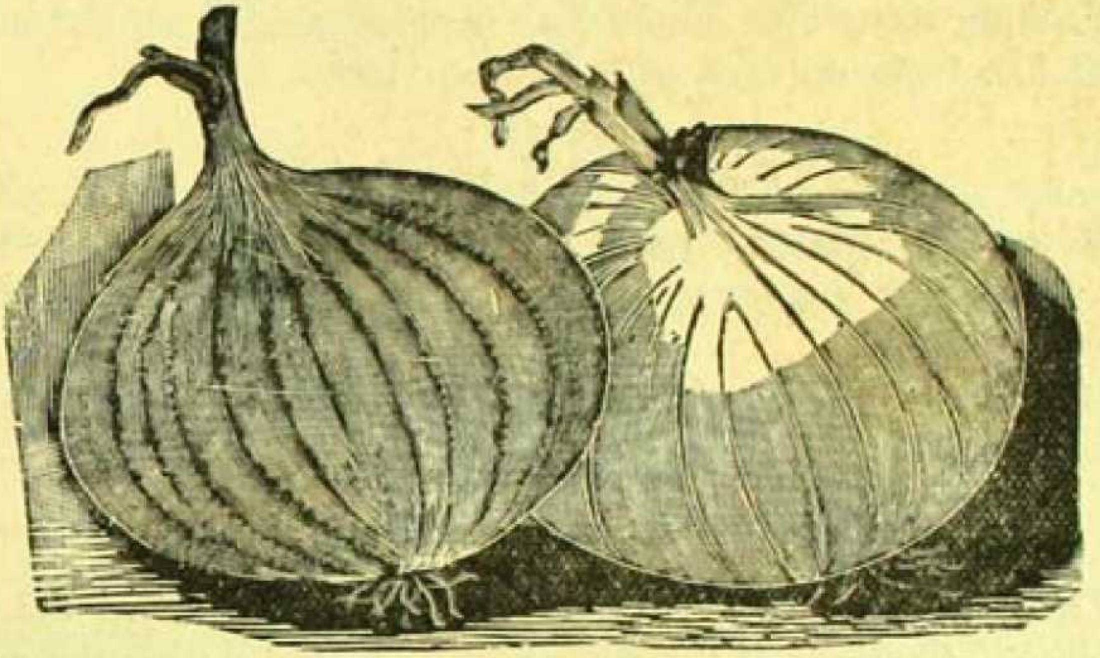
PEPPER (Chinese Giant)

ONION (*Piaz*)

Its cultivation has been described under English Vegetables.



ONION The Globe Nursery.

COWPEA (*Barbatti*)

About 2 *chataks* of seed are required to sow a plot of 1,000 sq. feet, and seeds may be sown from the middle of April to the middle of June, and again from the middle of October to the middle of November.

It is ready in 2 to 3 months. The yield is about 12 to 15 lbs. from an area of 1,000 sq. feet.

CAPE GOOSEBERRY (*Teparee*)

Seeds are sown in April-June in seed-beds, and seedlings are transplanted about 2 feet apart. When the plants are about 9 inches high, they should be earthed up to 4 inches. It may be grown on the ridges, as the plant does not stand water-logging.

It is ready in about 6-8 months, and is eaten when ripe or used in jams.

ROSELLE (*Patwa*)

Seeds may be sown in seed-beds from March to May, and seedlings transplanted 4 feet apart. This is a perennial crop.

Fruiting starts after about 5 to 6 months. The yield is about 80-100 lbs. from an area of 1,000 sq. feet.

YAM BEAN (*Sankalu*)

It may be planted from March to June at a distance of 3 feet apart. It is a growing creeper, grown on ridges, and vines allowed to ramble.

It is ready in 4 to 6 months, and the edible tuberous roots are taken up in the cold weather.

SWEET POTATOES (*Sakurkund*)

There are two varieties, one with red tubers, and the other with white. Cuttings of the creeper are planted during the months of September and October, 3 feet apart. About 70 to 120 cuttings are required for a plot of 1,000 sq. ft.

The crop is easily grown without any great care. The plant which is of a trailing habit is allowed to spread itself over the ground. The vines should, however, be cut back half their length once or twice during the growing period, as this induces thicker tubers.

The crop is ready in 3 to 4 months from planting. When the vines begin to turn yellow, all waterings should be stopped. Ripe tubers should not be allowed to remain in the ground. These should be pulled up, and stored in dry sand in an airy room. The yield is about 200 to 300 lbs. from an area of 1,000 sq. feet.

Kankri

Seeds are sown in beds, 4 to 5 feet apart, from the middle of March to the middle of May, and the crop is harvested during the rains.

Kankrole

It is generally grown from tubers from the middle of April to the middle of June. It requires a support. Harvested in the rains and in the winter.

Ucche

Seeds are sown 3 to 4 feet apart in October-December, and the crop is ready for harvest in February-April. It may also be sown from the middle of February to the middle of April.

BITTER GOURD (*Karela*)

The common sowing time is at the beginning of rains, but it may be sown from the middle of February to the end of July.

About half a *chatak* of seed is required to sow a plot of 1,000 sq. feet, and seeds are sown in beds, 6 feet apart.

It becomes ready for harvest after 3 months. The yield is about 200 lbs. from an area of 1,000 sq. feet.

SPONGE GOURD (*Jhinga*)

There are many varieties. About one *chatak* of seed is required per 1,000 sq. feet plot, and seeds are sown from the middle of April to the middle of July, in rows 4 to 5 feet apart, with 1 foot between the seeds. It may also be sown again from the middle of December to the middle of March. The vines need adequate support. Very often, they are trained on walls, trees, etc.

Fruiting takes place after 2 to 3 months.

The yield is about 200 to 300 lbs. from an area of 1,000 sq. feet.

PUMPKIN OR WHITE GOURD (*Chal Kumra*)

About ½ to 1 *chatak* of seed is required to sow one acre of land.

Seeds are generally sown from the middle of February to the middle of April. Seeds are sown in basins of about 2 ½ feet in diameter, 6 feet apart. 8 to 10 seeds may be dibbled in each basin, but 3 to 4 plants are kept per basin. The vines are usually supported on trellis, or trained to spread over the thatch of a house.

Fruiting starts in about 4 months. The fruits when ripe are gathered and usually hung up till required for use. The yield is about 200 lbs. from an area of 1,000 sq. feet.

BOTTLE GOURD (*Lau*)

There are many varieties with different shapes. About ¼ to ½ *chatak* of seed is required to sow a plot of 1,000 sq. feet.

Seeds may be sown from the middle of May to the middle of July, and again from the middle of September to the middle of January. Six to eight seeds should be dibbled in each basin, and later on 3 to 4 plants should be allowed to remain in each basin.

Trailing can be done on some support—preferably on bamboo 'machans', and this gives well-shaped and long fruits.

Fruits are ready for harvesting in 3 to 4 months after planting the seeds. The yield is about 200 to 300 lbs. from a plot of 1,000 sq. ft.

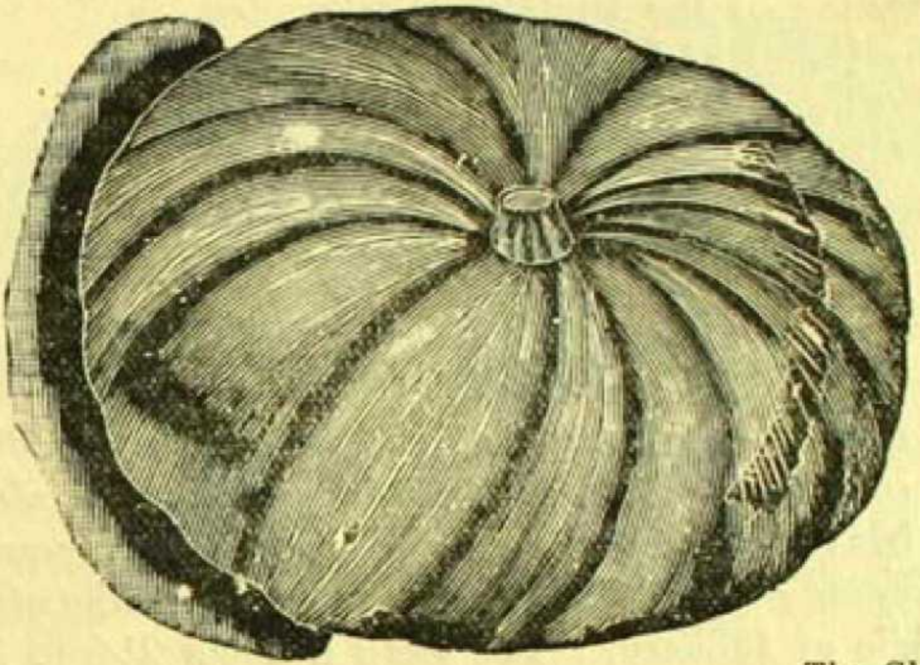
RED GOURD OR RED PUMPKIN (*Kumra*)

There are many varieties only differing from one another in size, shape and colour of the fruits.

Seed-rate is the same as for Bottle gourd.

Seeds are generally sown in March-April and May, and again from the middle of September to the middle of November. Sowings of seeds are just like that of Bottle gourd. It should be grown over a trellis or an outhouse during the rainy season to prevent the fruit rotting.

Fruits are ready for harvesting in 3 to 4 months after the seeds are sown. When large fruits are desired, only two or three should be left on each plant. The yield is about 200 to 300 lbs. from a plot of 1,000 sq. feet.



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PUMPKIN

SNAKE GOURD (*Chichinga*)

Seed-rate is about ½ to 1 *chatak* of seed to sow a plot of 1,000 sq. feet.

Seeds are generally sown from the middle of April to the middle of July, 6 inches apart, in rows, 5 feet wide, and the vines are staked up.

Fruiting takes place in August-September.

The yield is about 200 lbs. from a plot of 1,000 sq. feet.

Patal

This is a small oblong green gourd about 4 to 5 inches long.

It is generally propagated by cuttings which are planted from the middle of October to the middle of December, 2 to 3 cubits apart. The male and female vines are distinct, and about 5 per cent of the male plants are sufficient for the purpose of fertilisation.

Harvesting of the fruits may take place in 3 to 4 months' time. The leaves and tender shoots of the plant are in great demand. The yield is about 200 to 350 lbs. from an area of 1,000 sq. feet.

COUNTRY BEANS (*Shem*)

There are many varieties, having different colour, size and shape.

The seed-rate is about 2 to 3 *chataks* per 1,000 sq. feet. They are sown in raised beds, properly manured, chiefly from middle of May to the middle of July. The plants require trailing.

Harvesting generally takes place from the middle of November to the middle of January. The yield is about 2½ to 3 mds. per 1,000 sq. ft.

RADISH (*Moola*)

There are many varieties. The well-known '*Bombai Moola*' gives a better yield than the '*Deshi*' varieties.

Seed-rate is about 1 to 2 *chataks* of seeds for an area of 1,000 sq. feet. Seeds are broadcast from the middle of March to the middle of July, and again from the middle of September to the middle of November. The seed germinates in 3 or 4 days. When the seedlings are about 6 inches high, they should be thinned and may be used as pot herbs.

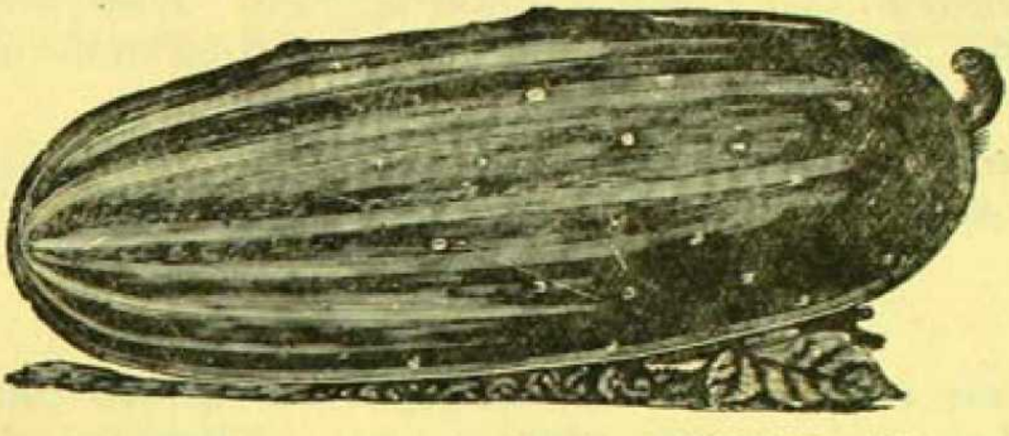
Harvesting takes place after two months of sowing. The yield is about 200 to 300 lbs. from a plot of 1,000 sq. feet.

CUCUMBER (*Sasha*)

There are many varieties.

Seeds may be sown from the middle of March to the middle of

May, and again from the middle of September to the middle of November, in rows or beds, 5' to 6 feet apart, the plants being 3 to 4 feet from one another.



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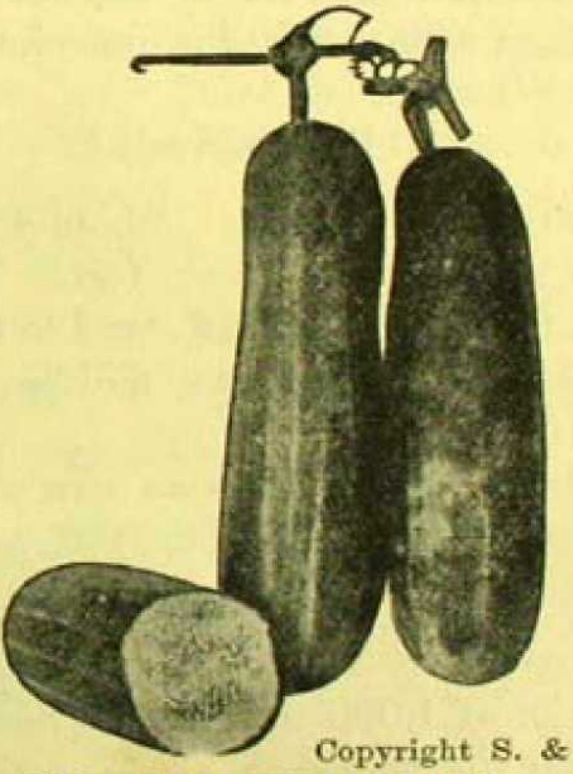
CUCUMBER

The crop is of 3 to 4 months' duration. The yield is about 200 to 250 lbs. from an area of 100 sq. feet.



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INDIAN CUCUMBER

The fruit is very largely eaten uncooked when young, but makes palatable dishes when cooked.

YAMS (*Kham Alu*)

These are propagated by sets. About 10 to 15 seers of sets are required to sow a plot of 1,000 sq. feet. These are planted in pits, 4 to 5 feet apart, from the middle of April to the middle of June.

Harvesting takes place after 8 to 9 months of planting. The yield is about 200 to 300 lbs. from a plot of 1,000 sq. feet.

CASSAVA (*Simul Alu*)

These are propagated by cuttings. About 150 cuttings are required to sow a plot of 1,000 sq. feet. These are planted in rows, 4 feet apart, and 2 feet apart, between cuttings, from the middle of March to the middle of June. The cuttings should be sprouted before planting.

Harvesting takes place after 10 to 12 months.

The yield is about 600 to 800 lbs. per plot of 1,000 sq. feet.

ARUM (*Kachu*)

These are propagated by tubers. About 4 to 7 seers of tubers are required to sow a plot of 1,000 sq. feet. These are planted, 1 ½ to 2 feet apart, from the middle of April to the middle of June.

Harvesting takes place from the middle of August to the middle of November.

The yield is about 400 lbs. from an area of 1,000 sq. feet.

ARUM (*Mankachu*)

These are propagated by bulbs. About 150 bulbs are required to sow a plot of 1,000 sq. feet. These are planted, 2 to 2½ feet apart, during the rains.

It is ready for harvest from the middle of August to the middle of November. The yield is about 250 to 350 lbs. from an area of 1000 sq. feet.

ELEPHANT'S FOOT (*Ol*)

It is propagated by bulbs. About 30 to 35 seers of bulbs are required to sow a plot of 1,000 sq. feet. These are planted, 1½ to 2 cubits apart, in pits, from the middle of May to the middle of June.

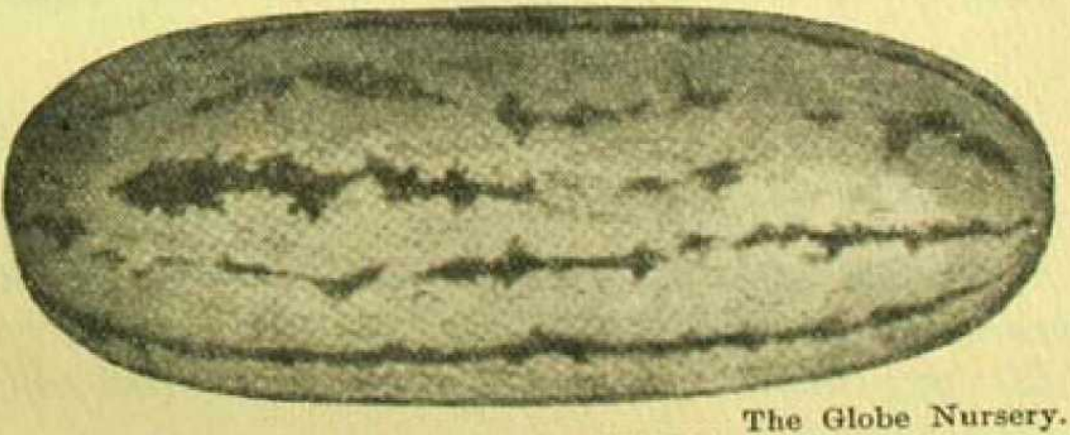
It is ready for harvest after six months. The yield is about 300 to 400 lbs. from an area of 1,000 sq. feet.

POT HERBS (*Sags*)

1. *Bethus*—Grown in July-August.
2. *Champa Nate*—Sown in March-April.
3. *Dengo Sag*—Sown in April-May.
4. *Gobra Nate*—Sown in May-June.
5. Indian Spinach (*Puin*)—Sown in May-June.
6. *Kanka Nate*—Grown in May-June.
7. Mint (*Podina*) Cuttings are planted in June-July, and seeds are sown in October.
8. *Palam Sag*—Sown in September-October.
9. Sorrel (*Chuka Palang*)—Sown in September-October.
10. Dil (*Sulpha*).
11. Cress (*Halim*).

MELONS.

Strictly speaking, melons fall under fruits, but they are also sometimes used as vegetables.



The Globe Nursery.

WATER MELON

Water melon (*Tarbuj*), melon (*Phuti*), and musk melon (*Kharbuj*) require a sandy soil.

Seeds may be sown from October to February in raised and well-manured beds, 4 feet to 5 feet apart.

Harvesting takes place after 3 or 4 months. The yield is about 2½ to 3 mds. per 1,000 sq. feet.

APPENDIX

I

MANURES AND FERTILISERS

Plants, like animals, require food for their sustenance and growth. If their food-supply is insufficient or unsuitable, they cannot grow and develop. The chemical elements composing the natural food of ordinary crops are ten in number, viz., carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, potassium, calcium, magnesium and iron. These are obtained from the soil and air, and unless all of them are available, plants will not grow. The absence of even one of them is as disastrous as the want of all, and a deficiency of one cannot be made up by an excess of another. All the food-elements are found in adequate quantities in practically all soils and the surrounding air, except three—nitrogen, potassium and phosphorus. These are often present in reduced amount, or in a state unsuited to plants; in such cases, the deficiency must be made up before remunerative healthy crops can be grown, and it is with this express object that manures and fertilisers are added to the soil.

Manures may be divided into two classes—General and Special.

General Manures

A general manure is one that is capable of supplying all the most important ingredients of plant life, nitrogen, phosphoric acid, and potash. They remain in insoluble forms, and their conversion into soluble forms is necessary, before the plants can make use of them.

The following are the principal general manures:

(a) Farmyard manure.
(b) Compost.
(c) Green-manuring.
(d) Oil cakes.
(e) Sewage and Sludge.

FARMYARD MANURE

It is the decomposed mixture of the excreta of domestic animals with the straw or the other litter that is used in the yards or stalls to absorb the liquid portions and to keep the animals clean. It is a slow-acting manure, and its effects are spread over a number of years. It may be easily understood that the composition of farmyard manure cannot be constant, varying with the nature of the animal making the dung, the kind and amount of food it receives, the proportion between excreta and litter, and the nature of the decomposition of the manure. The amount of nitrogen present in the animal's food is the most important consideration in determining the value of its manure. Generally speaking, animals fed on concentrated feeds, such as oil cakes, yield the richest manure, while those fed on straw and root crops, yield the poorest. The following is the order in which the different kinds of dung stand, so far as their manurial value is concerned:

(1) Bird's dung.
(2) Sheep and goat's dung.
(3) Horse's dung.
(4) Poultry and pig's dung.
(5) Human dung.
(6) Cattle dung.

Very little care is generally taken by the people to conserve the cattle dung properly, while the urine and other refuses are altogether neglected. The common practice is to stack the dung in the open, exposed to sun and rains, whereby the best part of the manure is altogether lost. The best method to conserve the dung is as follows:

Dig a pit and raise a small inexpensive shed over it, just to protect the manure from the sun and the rains. Plaster the sides and the bottom of the pit with mud and cow-dung to make it as impervious as possible. Collect the dung, surface earth of the floor soaked with urine, and other refuses, and even the sweepings from the houses on the yard, every morning, and spread the whole stuff in the pit. The urine should also be collected and used as manure. The floor of the cattle shed should be smooth, compact, and very well-rammed with a gentle slope towards one side, having a channel to carry the urine to a pot kept outside. The urine may thus be easily collected and spread over the dung in the pit. The dung thus kept in the pit will give a very valuable manure.

A well-rotted farmyard manure must have the following characteristics:

(i) Dark-brown in colour:
(ii) Even in texture, with no lumps of fresh straw or any kind of litter:
(iii) Fairly moist—neither too dry nor too wet:

COMPOST

Compost or artificial farmyard manure is a very good substitute for farmyard manure. Any kind of plant refuse like weedings from fields, sugarcane trash, cattle-food residues, farmyard sweepings, and even jungles, leaves of trees, town sweepings, aquatic weeds like water-hyacinth, etc., can be converted into a very valuable general manure for all soils and crops. In Bengal water-hyacinth is a veritable pest doing great harm to the economic life of the province. It is readily available in any quantity almost everywhere in the province, and can be converted into compost, thereby not only producing a very useful manure, but at the same time freeing the province of the obnoxious pest.

There are different methods of composting in vogue in different tracts of India. The method recommended by the Agricultural Department, Bengal, is described below:

A level high land, not liable to flood or water-logging during the rains, is the most suitable site for preparation of compost. It should preferably be in the shade of a spreading tree which excludes the sun, thereby preventing drying up of the material. Cattle-shed washings and water are essential for the preparation of the compost, and if the site is selected near a cattle-shed or a water reservoir, the labours entailed in carrying them will be very greatly minimised.

Whatever plant refuse be available should be collected, and brought to the site of the preparation, and spread uniformly and loosely into a layer of 1 foot high and 6 feet wide, the length depending upon the quantity of the stuff that is valuable. If dry or refractory materials like rejected paddy straw, sugarcane trash, etc., be used, it is always better to employ them as litter for 2 or 3 days before directly carrying them to the heap. Their absorption of cattle urine thereby will hasten their decomposition and also enrich them. Any material which can be used as bedding for cattle should be so used before being put on the layer. Very hard woody materials should be broken up before they are used. The layer must not be trampled or pressed. If bone-meal be easily available, it should be scattered on the layer at the rate of 2 to 3 seers per 100 square feet. If bonemeal be not easily available, the final product would be improved by adding a layer of fresh cow-dung and then one of earth, each layer being about an inch deep. The heap should then be thoroughly moistened, but *never wetted*, with uniform splashing of cattle-shed washings. In the absence of cattle-shed washings, urine or fresh dung of cattle dissolved in water at the rate of 1: 10 or 15 will do as well. After thus moistening the first layer, a second layer of 1 foot is to be built similarly over the first, and similarly moistened. This process continues till a heap, 4 feet high, i.e., 4 one-foot layers one above the other is made, and the heap is then to be left undisturbed for the time being. If water hyacinth be used for the preparation of compost, there being plenty of moisture in it, no watering, as a rule, is necessary, but as some activator is of great use in promoting fermentation and hastening decomposition of the raw materials, instead of using water-hyacinth exclusively, it is always better to mix it up with some (say one-third) dry or semi-dry materials in making the heap, and then to moisten the heap with cattle-shed washings, or solution of urine or dung in water as mentioned above.

There are two essential factors necessary for decomposition which must always be borne in mind, viz., (i) abundant aeration and (ii) sufficient moisture. For aeration, the materials should on no acount be pressed or trampled down, while being made into heap; the heap should never be made wider than 6 feet nor higher than 4 feet, and at no period should the mass be allowed to turn sodden. For moisture, at no period during the whole process should the mass be allowed to dry out completely. In rainy weather when everything is damp, no watering is at all needed, but during the rest of the year the heap should be moistened by watering whenever it shows signs of drying up. No general rule can ever be laid down as to the amount of water or frequency of watering needed for perfect decomposition of the mass. They depend on the kind of plant material used, the local circumstances, the weather conditions, and the season of the year. As a general rule, however, it can be said that no watering is required during the monsoon, and also when fresh green stuff like water-hyacinth, market garden refuse and aquatic weeds is used as the raw material. The maximum watering is required during the hot weather, and when dry materials are used for conversion.

To ensure uniform and thorough decomposition it is necessary to turn over the heap at least twice. The first turning over is to be done when the mass is half-decomposed. It takes about a month and a half to reach the stage when materials employed are dry, but less time in case of green stuff. Sugarcane trash takes double the time or even more. The process of turning over is best done by breaking the heap, and making a new one just beside it, in the same manner as above, building new heap from the bottom with the top layer of the old heap, and placing the undecomposed or partly decomposed materials at the interior of the new heap. While breaking the old heap and making a new one, the stuff of similar nature should be put together, leaving aside any hard substance like twigs, reeds, etc., to ensure uniform final product. If the mass lacks sufficient moisture, as it usually does, when being turned over, watering should be done to bring about the degree of moisture required for completion of the process of decomposition. The new heap should constantly be kept moist.

The second turning over will be required about a month after the first, and the new heap moistened similarly until the mass is completely converted into humus and fit for application to land. At the time of the second restacking, the top of the heap should be made of the shape of the top of a thatched hut with a view to prevent rain water from getting in. This is all the more necessary when the final product is not likely to be required for immediate application.

Under proper moisture conditions, it ordinarily takes about three months and a half for full conversion of the refuses into compost. A longer time is taken in the dry season, or when the stuff containing refractory elements is used as the raw material, and less time is required during the monsoon or when green material is used.

Careful experiments conducted at the Government farms indicate that well-prepared compost is as rich as cowdung, and often even richer.

GREEN-MANURING

It is the ploughing in of crops, whether natural or sown, for the purpose in their green state for renovating and improving the fertility of a soil. Leguminous crops, through the nodules on their roots, have special power in fixing the free nitrogen of the atmosphere. On ploughing in such crops, their roots, stems and leaves contribute a very valuable supply of combined nitrogen to the soil, along with organic matter. Of these crops, Dhaincha and Sunnhemp have been proved to be eminently suitable. As regards the time of ploughing under the green-manure crops, much depend on the crop which it is intended to benefit. It is recommended that all green-manuring crops should be ploughed in, if possible, when they are in flower, for it is at this period that they contain the largest quantity of easily soluble matter. It is of utmost importance to have the plants thoroughly incorporated with the soil.

Advantages of green-manuring:

(1) The vegetable matter which is so important for the growth of plants is more equally diffused through the soil than it could even be done by any merely mechanical means.

(2) The physical condition of the soil is improved.

(3) By its rapid growth suppression of weeds is effected.

(4) Decomposition of vegetable matter gives rise to acids, which act as solvents, and thus render available more material for plant nutrition.

OIL-CAKES

Oil-cakes are most fertilising of vegetable manures, as they are the richest in nitrogen. The chief oil-cakes are—mustard cake, castor-cake, groundnut cake, gingelly cake, linseed cake and cotton-seed cake. Of these, mustard, gingelly and groundnut cakes which contain nutritious food for cattle should first be fed to them, and their excreta applied subsequently as manure. Other cakes should go direct to the land as manures. Before applying an oil cake to the soil, it should be broken into meal and then broadcasted over the land evenly, or in places where the plants are expected to grow.

SEWAGE AND SLUDGE

Sewage is the refuse carried away by sewers in places which have adopted the water-carriages system, and is a mixture of human excrements discharged from water closets and privies, water from kitchens containing vegetable, animal and other refuse, soapy water from domestic and other sources, drainage from stables of horses, cattle, and other animals, and from slaughter houses, containing fat, blood, and other animal and vegetable refuse. It further contains the drainage from the streets, vegetable and animal refuse mixed with the material of which the roads consist, and which, to the extent to which it has been reduced to dust by traffic, is washed into the sewers by rain. In industrial centres it may also contain refuse from the different trades carried on; and where the quantities of refuse discharged from manufacturing operations are large, they may seriously affect the character of the sewage. Broadly speaking, sewage is thus a mixture of solids and liquids.

The manurial properties of sewage have been utilised from times immemorial in many countries. But even the best soil can only absorb comparatively small quantities of manurially valuable constituents in sewage. In some cases, sewage in its crude state is applied, and in others it receives a preliminary settling to free it from the coarsest particles. The best arrangement, however, is that in which as much as possible of the suspended matter has been removed from the sewage before it is applied to the soil. The reason for this is two-fold. In the first instance, it is not desirable that faecal matter should become mixed with crops which appear above ground. In France, the law does not allow sewage to be used on land on which vegetables used for raw consumption, such as salads are grown, so soon as the plant appears above ground. But the more important reason is that fatty and soapy matter it contains, and which to a great extent can be removed by settling or precipitation with chemicals, soon clogs up the soil.

The solid matter which is contained in sewage sludge is of considerable manurial value; it contains nitrogen, potash, and also a large amount of organic matter, which tends to lighten the soil and render it porous. But experts hold the view that if the sludge is applied to the land in large quantities and regularly, it clogs up the soil. It should therefore be used in small quantities and intermittently. Before use, it should be powdered up and mixed with the same volume of ordinary earth, and the mixture then used as if it were farmyard manure. When the sludge is watered it gives a slightly unpleasant smell for a few days which gradually passes off.

SPECIAL MANURES

A special or an artificial manure contains in itself plant food in such form that it is directly available, either at once or after a short time, for the needs of the growing plants. One or more of the three substances—nitrogen, phosphoric acid and potash will constitute the essential part of a special manure. It is also called a direct fertiliser opposed to an indirect fertiliser which serves to render available the food already present in the soil; the most common indirect fertilisers are gypsum and common lime.

Special manures are divided into:

(1) Nitrogenous manures: Nitrogen is mainly concerned with the vegetative growth of the plant, with the formation of leaf and stem that are the necessary preliminaries to complete development. A deficiency in nitrogen in the soil results in a stunted growth of the crop growing on it. Some soils fail to produce good crops—specially vegetables which become sickly and yellow in colour soon after they appear above the ground. This condition indicates a lack of nitrogen available for plant use. The presence of nitrogen in the soil darkens colour of the foliage of the crop, thus showing a healthy state of growth. An excess of it is not favourable to the production of flowers. The formation of flowers

will in this case be retarded or checked. The energy of the plants thus diverted is transferred to stems and leaves which thus take on new vigour and growth.

Generally speaking, nitrogenous manures

(1) tend to increase the vegetative or leaf-producing power of the plants, and
(2) give a good start to them.

Those crops that are valued for leaves only, such as cabbages, pot herbs, tobacco, betel-leaves, etc. are specially benefited by these manures. They are nitrate of soda, nitrate of potash, sulphate of ammonia, etc.

(b) Phosphatic manures have the opposite effect to nitrogenous fertilisers, checking rampant growth and encouraging the early formation of flowers, fruits and seeds. They

(1) tend to stimulate the early development of the young seedling to a remarkable extent;
(2) lead to the tillering of the plant which is extremely important in case of paddy;
(3) tend to increase the flowering and fruiting tendencies of the plant;
(4) tend to make the fruits and roots of the crop sweeter, and
(5) make ripening of crops to take place earlier.

Phosphatic manures are bone-meal, bone ashes, superphosphate of lime, basic slag, etc.

(c) Potashic manures are of benefit to plants in all stages of growth, and enable them to withstand adverse conditions of soils and climate. Crops grown on soils well-supplied with potash are more resistant to disease. These manures are intimately connected with the formation of starch and its movement from one part of the plant to another. They are also helpful to the production of leaves, elaboration of acid juices of fruits, formation of roots, and also to flowering and fruiting.

LIME

A word or two must be said about lime, which is a natural constituent of all soils. In many instances there is sufficient for the needs of most plants, but where lime is deficient in quantity it must be added before healthy crops can be raised. While actually not a manure, it breaks down insoluble compounds which may be inert, and makes plant food immediately available. It digests, as it were, plant foods, especially potash, flocculates clay soils, prevents cracking, and on sandy soils cements the particles together. It counteracts acidity, and forms a base on which other acids may combine. Lime is essential to decomposition. Gardens should be thoroughly limed every 3 or 4 years. A light dusting of crushed limestone or slaked lime spread over the bed and dug in atleast one month before the application of manures will be beneficial to the crops. Every year is not out of the place where there is a heavy rain-fall. Lime plays also an active part in reducing attacks of many diseases and insects.

GENERAL INSTRUCTIONS

General or complete fertilisers whether, natural or manufactured, are those which contain the three principal elements of plant food, namely, nitrogen, potassium and phosphorus. Farmyard manure or compost is the best known natural complete fertiliser, and when either of them can be obtained, its use is highly to be recommended not only because of the plant food it contains, but also because of its physical effect on the texture and water-holding powers of the soil itself. The best results are, however, obtained by a judicious combination of farmyard manure or compost with complete manufactured fertilisers. It must however be remembered that farm yard manure or compost should be dug in during the open weather, some time before the sowing or planting the crops, but artificial fertilisers should generally not be applied until a week or two before sowing. Further applications can be made during the period of growth.

Various kinds of crops exhibit great differences in their powers of assimilating plant foods in the soil. Some crops have the greatest power of assimilation, and some the least. Roots, such as, carrots, turnips, beet and potatoes require large quantities of plant food, because their capacity of assimilating it is so inferior to other crops, that even on naturally rich soils, full crops cannot be obtained unless the ground has been wellmanured.

Potatoes, for example, respond to and require a fertiliser containing a high percentage of potash. Other crops respond better to fertilisers containing a high proportion of nitrogen or phosphorus. Leguminous crops need especially phosphatic and potash manures, but do not require very large quantities of nitrogenous manures, for the reason that they can obtain nitrogen from the air. Different crops therefore require different treatment in respect of manures, and it is thus advisable to purchase a fertiliser specially compounded for the crop in question. But a knowledge as to when, how, and in what quantities it should be applied is essential, and for this, full instructions should be obtained from the dealers, while purchasing a fertiliser. For example, nicifos and sulphate of ammonia are good fertilisers for most of the vegetables. In case of potatoes, for one bigha (1/3rd acre), 20 seers of sulphate of ammonia should be mixed thoroughly with powdered mustard oil cake or castor cake, and the mixture then spread evenly along the bottom of the furrows and mixed with the soil. The seed-potatoes may then be planted in the furrows. As soon as the potatoes have germinated, the land should be irrigated and watering continued as often as possible. For cabbage, cauliflower, knolkhol, lettuce, etc. nicifos or sulphate of ammonia may also be applied with advantage in two instalments, once before earthing the plants, sulphate of ammonia or nicifos may be applied at the rate of 20 seers per bigha (1/3rd acre), and the second application of sulphate of ammonia may be made after three weeks at the rate of one maund per bigha.

Similarly, radishes, carrots and turnips may be benefited by two applications of nicifos at the rate of two maunds per bigha. When a soil is ready for transplanting onion seedlings, scatter 50 seers of nicifos or sulphate of ammonia per bigha evenly into the harrowed lines and rake the fertiliser thoroughly into the soil. Then transplant the seedlings in the usual way.

LIFE HISTORY OF INJURIOUS INSECTS & COMMON REMEDIES TO COMBAT THEM

The life history of an insect deals with four stages, the egg, larva, pupa and adult. The larval and pupal stages vary considerably. The former is the period of growth and the latter is the period of change or metamorphosis—the period when the larva is transformed into the adult. It is a very curious process. During the pupal stage, the greater part of the organisation of the larva is destroyed and remodelled into the adult, which bursts out of the pupal shell the fully winged or perfect insect. There is no growth in the adult stage. A small fly does not become a large fly, a small bee a large bee; the larval period only is the period of growth, the adult of reproduction.

There are two kinds of metamorphosis in insects, known as complete and incomplete metamorphosis. In the former, we have the egg, the active feeding larva, the quiescent pupa (the period of metamorphosis) and the active sexual adult. In the second, we have nominally the egg, the active, feeding, growing larva, an active feeding nymph or pupal stage, and then the adult. There is no complete change as in the former, but a gradual growth from the larval stage into the adult. The first we see in the change of a butterfly-caterpillar into a butterfly, the second by the gradual growth of a young wingless grasshopper into the winged creature, wing buds appearing in the larva and gradually growing out. Some grasshoppers remain, as it were, in their larval conditions permanently. There are some primitive insects which undergo no metamorphosis at all.

Insects with complete metamorphosis are—beetles, ants, bees, wasps, butterflies and moths, flies. Insects of incomplete metamorphosis are—bugs, dragon flies, aphis, grasshoppers, etc.

Insects may cause damage in all three stages—in the larval, pupal and adult forms. Only those which undergo an incomplete metamorphosis, such as the 'aphis' can however do anỳ harm in the pupal stage: the quiescent pupa of a moth or sawfly can do no harm. Generally speaking, it is the larval stage which is most harmful.

Insects may be classified into two separate classes according to their feeding habits: (a) biting insects and (b) sucking insects.

The biting insects have biting mouth parts, having jaws with which they chew the leaves upon which they live. These are caterpillars, grubs, grasshoppers, crickets, slugs, snails, pumpkin beetles, etc.

The sucking insects have no biting jaws. They insert their beaks through into the sap and suck it from the inner tissues of the leaf, stem or fruit. These insects are aphis, lice, mite, thrips, mealy bug, red spider, vegetable bug, etc.

COMMON REMEDIES

Various remedies are now adopted to combat insect and other pests. These consist of clean cultivation whereby weeds and undergrowths are removed, rotation of crops, proper cultivation of the soil, proper use of fertilisers, sowing of seeds from healthy stocks, drainage, etc; mechanical means—namely, hand-picking, trapping; and the employment of insecticides—which are substances or mixtures used to kill insects. These are of three kinds, contact poison to suffocate, stomach poison to kill, and repellent to drive away. The biting insects may be killed by spreading food-poison over the plants, repeating it occasionally. The sucking insects cannot be killed by food-poison. The insecticides may be either used as dusts or powders, or as fluids in the form of "washes" or so called " spray fluids."

The application of insecticides by dusting on is a remedy that is only successful if the foliage is first wetted so that the dust may stick. All such dustings should be therefore done in the early morning, while the plants are wet with dew. It is useless when showers of rain wash off the adhering dust, shortly after application.

As regards the application of fluids, the object generally is to send the " fluid " insecticides in as fine a mist possible, so that every part of the tree or plant is wetted by them. This is done by using considerable pressure, driving the fluid out with air through special nozzles, so that the particles are finely divided. Sprayers, syringes, etc. are used for this purpose.

The following are the common insecticides:—

(a) Food-poison to kill biting insects:

(i) Paris Green.

Paris Green	1 lb.
Water	50 gallons.

(ii) Lead Arsenate or Lead Chromate

Lead Arsenate or Lead Chromate	1 lb.
Water	50 gallons.

It is better to add 4 lbs. of lime in each case before use, so that the solution may not injure the leaves.

Borers are biting insects, but it is not possible to kill them by spreading food-poison over the plant if they once get into the trunk or stem of the plant, and in dealing with them it is best to put a coating of tar round the base of the trunk or stem upto a certain height from the ground. A wire run up the hole is also one of the methods of killing the borers. The hole may also be plugged with cement or tar.

(iii) Poisoned baits are also used in many cases:

A poisoned bait may be made of two tea-spoonfuls of treacle, one of Paris Green and two table spoonfuls of water with sufficient bran to make a paste. This is very useful for cut worms working just at the surface of the soil. Another bait may be prepared of 2 oz. of Paris Green or white arsenic, 3 oz. bran, and 1 oz. salt. This should be dried, moistened with molasses and water, and spread out on eating grounds. This is particularly useful for crickets.

(b) Contact poison to kill sucking insects:

(i) Kerosene emulsion

Soap	½ lb.
Kerosene	2 gallons.
Water (hot)	1 gallon.
Water	30 gallons.

Soap should be dissolved first in hot water and then kerosene added to it, and the mixture then stirred for about half an hour. This should be diluted ten times with water at the time of spraying.

(ii) Crude Oil emulsion:

It is an emulsion made of 20 per cent of soft soap with 80 per cent of crude mineral oil (containing kerosene). The ready-made material is sold in the market and should be used with water in the proportion of 1 to 60.

(iii) Tobacco solution:

The solution should be made of 1 lb. of tobacco dust steeped in two gallons of water, for 24 hours, strained through cloth, and then mixed with two gallons of water. To destroy 'aphis' green-fly, this solution is very useful.

(iv) Soap Emulsion:

Soap	1 lb.
Water	1 gallon.

Hot water should be used to dissolve the soap properly.

(v) Ordinary phenyle or kerosenised water may be used to drive away the red and white ants and crickets.

(vi) Dustings:

Dusting with fresh lime may be useful in case of snails and slugs.

Beetles may also be checked by dusting with 1/4 lb. powdered tobacco to 4 lbs. wood ashes or 1/4 oz. of Paris Green to 1 lb. Slacked lime.

Dusting with dry and powdered sulphur also controls many insects—specially spiders, mites, etc.

In using an insecticide for the first time, it is advisable to try it on one or two plants only. If the preparation is too strong, it will be discovered by the state of the plant within 24 hours; thus a little caution may prevent a great loss. It is a good rule to employ the insecticide in a rather weak state until experience has been gained.

The following remedies should also be remembered:

(1) Hand-picking should always be resorted to. It is best for the caterpillars, snails, bugs, etc.

(2) Burning out the web-worms; this is useful in case of leaf-miners and leaf-rollers.

(3) Cutting off the branches and burning them—particularly in case of hole borers, or where the galls and deformities are formed.

(4) Flooding—in case of crickets and for insects which hide in the soil.

(5) Using a hand-net or bagging for insects which jump when disturbed.

(6) Using a light trap—specially for night-flying insects.

Many insects are attracted by lights. A light placed in the centre of a bowl of water mixed with castor oil will be useful in this connection. The insects when they fall in the water will not be able to climb up.

(7) Worrying the insects—by dragging a rope.

III

FUNGICIDES

Bordeaux Mixture

Copper Sulphate	4 lbs.
Lime	4 ,,
Water	40 gallons.

Get three barrels and put sufficient water in one, and hang the copper sulphate in a piece of cloth in it so that it may dissolve easily. In another barrel with the same quantity of water, slake the lime. When the copper sulphate has been properly dissolved, and also the lime properly slacked, pour equal quantities of each in the third barrel. It is better to strain the two solutions before they are mixed up. The final solution may be tested by dipping a clean knife which will turn reddish if there be an excess of copper in the solution—and in this case more lime should be added.

BURGUNDY MIXTURE

Copper Sulphate	4 lbs.
Washing Soda	4 ,,
Water	40 gallons.

It is prepared in the same way as Bordeaux Mixture.

IV

NATURAL ORDERS OF VEGETABLES

Natural order.	English vegetables.	Country vegetables.
1. Leguminosae	Peas, Beans.	Country beans, Cow-pea, Yambeans.
2. Cruciferae	Cabbage, Cauliflower, Knolkhol, Turnip, Radish.	Radish.

3. Compositae	Lettuce.	
4. Liliaceae	Onion.	Onion.
5. Solaneae	Potatoes, Tomatoes.	Brinjals, Chillies.
6. Malvaceae		Rosselle, Cape gooseberry, Lady's finger.
7. Chenopodiaceae	Beet.	Country spinach.
8. Umbelliferae	Carrot.	
9. Convolvulaece		Sweet potatoes.
10. Cucurbitaceae		Bitter gourd, Sponge gourd, White gourd, Bottle gourd, Red gourd, Snake gourd, *Patal*, Cucumber, Melons.
11. Dioscoreae		Yams
12. Aroideae		*Mankachu*, *Kachu*, *Ol.*
13. Euphorbiaceae		Cassava.

V

SEED-RATES AND APPROXIMATE OUTTURNS PER ACRE

English Vegetables

	Seed-rates	*Outturn.*
1. Peas (Field)	24—30 seers	50— 60 maunds
2. Beans	4½— 6 ,,	,,
3. Beet	2½— 3 ,,	150—200 ,,
4. Radish	3½— 4 ,,	,,
5. Carrots	4½ ,,	120—160 ,,
6. Turnips	1½— 2 ,,	150—200 ,,
7. Potatoes	6 —10 maunds	300 ,,
8. Cabbage	9 —12 oz.	,,
9. Cauliflower	9 —12 ,,	150—200 ,,
10. Knolkhol	9 —12 ,,	150—200 ,,
11. Onion	¾— 1 lb. sets—one maund	150 ,,
12. Lettuce	2 — 3 lb.	60 ,,
13. Tomatoes	½— 1 lb.	250—300 ,,

COUNTRY VEGETABLES

1. Brinjal	4— 6 *chataks*	100—150 maunds
2. Lady's finger	3—4½ seers	60— 80 ,,
3. Chillies	⅛— ¼ ,,	20— 30 ,,
4. Cowpea	15—18 ,,	6— 10 ,,
5. Cape gooseberry	⅛ ,,	—
6. Roselle	3— 4 ,,	40— 50 ,,
7. Sweet potatoes	3,000 to 5,000 cuttings	100—150 ,,
8. Yam beans	3— 4 seers	40— 50 ,,
9. Bitter gourd	¾— 1 seer	90—100 ,,
10. *Kankri*	8—12 *chataks*	80—100 ,,
11. *Kankrole*	..	90—100 ,,
12. *Ucche*	¾— 1 seer	100—125 ,,
13. Sponge gourd	1½— 2 seers	100—150 ,,
14. Pumpkin or White gourd	1—1½ ,,	90—100 ,,
15. Bottle gourd	⅓— ¾ ,,	100—125 ,,
16. Red gourd	,,	,,
17. Snake gourd	1—1½ seers	90—100 ,,
18. *Patal*	4,000 cuttings	120—150 ,,
19. Country beans	4½— 6 seers	90—120 ,,
20. Radish	2— 4 ,,	125—150 ,,
21. Cucumber	⅛ seer	100—125 ,,
22. Yams	10—15 mds. of sets	100—150 ,,
23. Cassava	6,000 cuttings	400—500 ,,
24. *Kachu*	4½— 6 mds tubers	180—200 ,,
25. *Mankachu*	6,000 bulbs	120—180 ,,
26. *Ol*	16—19 mds. of bulbs	150—200 ,,
27. Various *sags*	½ seer	—
28. Melons	¼— ½ seer	100—150 ,,

VI

VITAMINS

Vitamin A—A deficiency of this vitamin in the food causes retardation in the growth of children, night blindedness, certain changes in the skin and the lining of body cavities and makes them more vulnerable to infection.

Vitamin B Complex—A deficiency of this vitamin produces loss of appetite, constipation, neurasthenia, mental disturbance, palpitation, lack of vigour and growth, paralysis of certain nerves, certain changes in the eyes, mouth, nasal lining and skin, abdominal distension, diarrhoea, and redness, peeling off and pigmentation of the exposed parts of the body and genitals.

Vitamin C—A deficiency of this vitamin is characterised by weakness, increased irritability, loss of appetite, spongy gums, pus in the gums, loosening of teeth, scurvy and increased tendency to bleeding, pain and swelling of the extremities.

Vitamin D—A deficiency of this vitamin is characterised by delayed bonegrowth, defective tooth structure, rickets and tetany in infants and children and spongy structure of bone in adults.

Vitamin E—A deficiency of this vitamin may produce threatened or habitual abortion and even sterility in women.

Vitamin K—A deficiency of this vitamin increases the tendency to abnormal bleeding by interfering with the clothing power of the blood.

We may provide ourselves with the above vitamins by eating the following vegetables for each kind.

For Vitamin A—Cabbage, sweet potatoes, *palang sag*, *turnip* leaves, lettuce, peas, tomatoes and other green leaves.

For Vitamin B—Palang sag, turnip leaves, asparagus, beans, cabbage, lettuce, peas, celery, etc.

For Vitamin C—Tomatoes, *palang sag*, cabbage cauliflower, peas, lettuce, potatoes, yam beans, radish leaves, radish, turnip, onion, cucumber and other fresh vegetables and pot herbs.

For Vitamin D— *Palang sag* (chiefly), beans, and potatoes.

For Vitamin E—Lettuce (chiefly).

VII

EAT MORE VEGETABLES

AND

EAT A BALANCED DIET:

(Dr. J. N. Maitra, M.Sc., M.B., D.T.M., D.P.H.).

Vegetables and green foliage are devoured by men and animals. Since the dawn of civilisation, they have made the natural selection of their own food. Vegetables constitute bulk of food for almost all living animals, except the carnivorous section of animals, who devour each other or the herbivorous animals.

The most tragic discovery of fire makes the modern food mostly depleted of its vitality. With the discovery of fire, our fore-fathers introduced food to be cooked and then spiced with condiments to relish. Slowly, with the further growth of villages, towns and cities, people required more food and more accessories. Then, trade and industry drew people more and more to huddle in these places. Many diverse problems have now necessitated the revision of our knowledge and have compelled us to go back to the most early problem, viz., cannot green vegetables and grass take the place of the civilised man's food? And, the question has been answered by a scientist during this year's Science Congress at the Science College, Calcutta. Ordinary grass (Gramineae) contains 20% proteins, enough carbohydrates, fat, and sufficient salts, and all the Vitamins. After this revelation, a professor had experienced that vegetable chops made entirely of grass smashed and cut into small pieces (lest its long fibres may induce retention and thereby causing intestinal obstruction) tasted quite well and all of them took some more with relish. Later, it was revealed that those were prepared of grass intended for their cows. In England at the present moment experiments with grass as to how far it can replace costly foods are being done and periodically its results published.

Now, let us consider the problem as to how far 'balanced diet' can be menued out of vegetables and leafy foliage. Beans and peas of the legume class are very rich in proteins and amino acids. Soyabean contains substitute for milk proteins. Germinating peas, beans, legumes of different classes can provide high proteins and it has been proved that these are quite assimiliable. Potatoes, radish, and different tubers are rich sources of carbohydrates. Nuts of different varieties e.g. monkey nuts, cocoanuts, and oil seeds can supply fat factor of our dietary. Tomatoes, lettuce, salad, *palang* and other *sags* can provide not only vitamins, but also all the salts and extractives. Sir Arbuthnot Lane, most veteran surgeon, who died a few days ago, declared that meat is more dangerous than even alcohol. He had an experience of more than half a century of medical practice; and he, for his opinion of more vegetables and more farinaceous food to replace meat and to obviate surgical interference, had to retire. Now, Dietetic experts are beginning to appreciate him after he is no more.

With a judicious selection of suitable vegetables for individual taste and liking one can select one's own, 'balanced diet.' By a 'balanced diet' we mean that suitable proximate principles of proteins, carbohydrates, fats, vitamins, salts and water in proportionate quantities for body weight at rest and for particular work have been provided for.

For the upkeep of the health of an average Bengali individual on a very moderate work, the following quantities of the above mentioned proximate principles are generally required, e.g. Proteins 1½ to 2 *chatacks*, Carbohydrates 7½ *chatacks* and Salts ½ *chatack*. In addition to above, Vitaminous substances in the form of vegetables and leafy foliage are also required to constitute the "balanced diet." Carrots contain Carotin, the mother substance of Vitamin A. The hydrolysis of one molecule of Carotin will yield 2 molecules of Vitamin A in Vitro.

Vitamin B is in plenty in pericarps of cereals and now Synthetic product from the West e.g. Thiamine Chloride is attempting to take its position in Vivo. Ascorbic Acid present in Amla, (*Amlaki*) citrous fruits and vegetables is the accepted name of Vitamin C, Cevitaminic Acid, and Ribo-Flavin is now known as Vitamin G. So, we find that ingredients in the vegetable world can give us all that is necessary from a scientific stand-point.

All the above ingredients are available from the foods necessary for maintaining basal metabolism and providing for sufficient calories and food values for moderate work from the following menu per diem:—

Rice—1 to 1½ *poa* i.e. 4 *chatacks* to 6 *chatacks*.
Dal—1½ *chatacks*.
Atta—4 *chatacks*.
Ghee or Butter—¼ *chatack*.
Oil—¼ *chatack*.
Vegetables—6 *chatacks*.
Fish—2½ *chatacks*.
Salts—½ *chatack*.
Milk—5 to 8 *chatacks*.
Sugar or *Gur*—½ *chatack*.

Along with these substances an average Bengali takes lemons, tamarind, cucumber, plantains and fruits in the seasons.

95% of Bengalis live in villages where dearness of vegetables is even now myths. Tanks and rivers there are in number for fish; cows may be kept and fed at a very small cost to provide milk. We must "Grow More Vegetables" both leafy and tuberous varieties to spare proteins by Carbohydrates. Only thing needed is that more manly physical exercises for adults and in case of boys more sports and play to burn excessive dose of Carbohydrates provided by these vegetables and tubers are the most urgent necessity.

GROW MORE VEGETABLES: EAT MORE VEGETABLES:

The total war that is at our door demands of us growing more farinaceous food in our cry for "Grow More Vegetables," and side by side, it scientifically demands that extra energy thus produced must be spent in taking more active part in the total war over land and water as well as in the air for manly movement of muscles and straining the nerves to un-nerve the enemy of civilisation for the attainment of final victory.

VIII

SAMPLE MENUES OF 'BALANCED DIET'

[COL. A. C. CHATTERJEE, I.M.S.]

A

A sample menu of 'balanced diet' at Rs. 3 per head per month.

NON-VEGETARIAN

Diet	Daily in oz.	Price per lb.			Total price.		
		Rs.	a.	p.	Rs.	a.	p.
Raw, pounded rice	18	0	0	7½	1	5	3
Puffed rice	1	0	0	9	0	1	5
Beaten rice	1	0	0	9	0	1	5
Bengal gram	½	0	0	9	0	0	8½
Green gram	½	0	0	7½	0	0	7
Red gram	½	0	0	7½	0	0	7
Lentil	½	0	0	9	0	0	8½
Potato	1	0	0	9	0	1	5
Drumstick	1	0	0	3	0	0	5½
Tomato (ripe)	½	0	0	6	0	0	5½
Carrot	1	0	0	3	0	0	5½
Bitter gourd	1	0	0	6	0	0	11
Amaranth	1	0	0	3	0	0	6
Fenugreek	1	0	0	3	0	0	6
Mustard oil	1½	0	3	0	0	8	5½
Salt, condiment and molasses	..		..		0	3	11
Small fish	1	0	0	9	0	1	5
Butter milk	4	0	0	4½	0	2	10
TOTAL	..		..		3	0	0

B

A sample menu of 'balanced diet' at Rs. 3 per head per month.

VEGETARIAN

Diet	Daily in oz.	Price per lb.			Total price.		
		Rs.	a.	p.	Rs.	a.	p.
Raw, pounded rice	18	0	0	7½	1	5	3
Puffed rice	1	0	0	9	0	1	5
Beaten rice	1	0	0	9	0	1	5
Bengal gram	½	0	0	9	0	0	8½
Green gram	½	0	0	7½	0	0	7
Red gram	½	0	0	7½	0	0	7
Lentil	½	0	0	9	0	0	8½
Potato	1	0	0	9	0	1	5
Drumstick	1	0	0	3	0	0	5½
Tomato (ripe)	½	0	0	6	0	0	5½
Carrot	1	0	0	3	0	0	5½
Bitter gourd	1	0	0	6	0	0	11
Amaranth	1	0	0	3	0	0	6
Fenugreek	1	0	0	3	0	0	6
Mustard oil	1½	0	3	0	0	8	5½
Salt, condiment and molasses ..	..		..		0	3	7
Milk	5	0	0	6	0	4	7
TOTAL ..			..		3	0	0

C

A sample menu of 'balanced diet' at Rs. 4 per head per month.

NON-VEGETARIAN

Diet	Daily in oz.	Price per lb.			Total price.		
		Rs.	a.	p.	Rs.	a.	p.
Raw, pounded rice	18	0	0	7½	1	5	3
Puffed rice	1	0	0	9	0	1	5
Beaten rice	1	0	0	9	0	1	5
Bengal gram	½	0	0	9	0	0	8½
Green gram	½	0	0	7½	0	0	7
Red gram	½	0	0	7½	0	0	7
Lentil	½	0	0	9	0	0	8½
Potato	1	0	0	9	0	0	5
Drumstick	1	0	0	3	0	0	5½
Tomato (ripe)	½	0	0	6	0	0	5½
Carrot	1	0	0	3	0	0	5½
Bitter gourd	1	0	0	6	0	0	11
Amaranth	1	0	0	3	0	0	6
Fenugreek	1	0	0	3	0	0	6
Mustard oil	1½	0	3	0	0	8	5½
Small fish	1	0	0	9	0	1	5
Salt, condiment and molasses	..		..			3	11
*Mutton	2$\frac{2}{7}$	0	2	0	0	8	0
Milk	8	0	0	6	0	7	6
Papayya	1	0	0	4½	0	0	8½
Ghee	1/5	0	7	0	0	2	7½
TOTAL	..		..		4	0	0

* Mutton to be taken bi-weekly 8 oz. each time which gives a daily average of 16/7 oz. per day.

GROW MORE VEGETABLES: EAT MORE VEGETABLES:

D

A sample menu of 'balanced diet' at Rs. 4 per head per month.

VEGETARIAN

Diet	Daily in oz.	Price per lb.			Total price.		
		Rs.	a.	p.	Rs.	a.	p.
Raw, pounded rice	18	0	0	7½	1	5	3
Puffed rice	1	0	0	9	0	1	5
Beaten rice	1	0	0	9	0	1	5
Bengal gram	½	0	0	9	0	0	8½
Green gram	½	0	0	7½	0	0	7
Red gram	½	0	0	7½	0	0	7
Lentil	½	0	0	9	0	0	8½
Potato	1	0	0	9	0	1	5
Drumstick	1	0	0	3	0	0	5½
Tomato (ripe)	½	0	0	6	0	0	5½
Carrot	1	0	0	3	0	0	5½
Bitter gourd	1	0	0	6	0	0	11
Amaranth	1	0	0	3	0	0	6
Fenugreek	1	0	0	3	0	0	6
Mustard oil	1½	0	3	0	0	8	5½
Cow's milk	12	0	0	6	0	11	3
Dahi	8	0	0	6	0	7	6
Papayya	2	0	0	4½	0	1	5
Salt, condiment and molasses	..		..		0	4	0
TOTAL	..		..		4	0	0

GROW MORE VEGETABLES: EAT MORE VEGETABLES:

E

A sample menu of 'balanced diet' at Rs. 5 per head per month.

NON-VEGETARIAN

Diet.	Daily in oz.	Price per lb.			Total price.		
		Rs.	a.	p.	Rs.	a.	p.
Raw, pounded rice ..	.. 18	0	0	9	1	9	3
Puffed rice	.. 1	0	0	9	0	1	5
Beaten rice	.. 1	0	0	9	0	1	5
Bengal gram ..	.. ½	0	0	9	0	0	8½
Green gram ..	.. ½	0	0	7½	0	0	7
Red gram	.. ½	0	0	7½	0	0	7
Lentil	.. ½	0	0	9	0	0	8½
Potato	.. 1	0	0	9	0	1	5
Drumstick	.. 1	0	0	9	0	0	5½
Tomato (ripe) ..	.. ½	0	0	6	0	0	5½
Carrot	.. 1	0	0	3	0	0	5½
Bitter gourd ..	.. 1	0	0	6	0	0	11
Amaranth	.. 1	0	0	3	0	0	6
Fenugreek	.. 1	0	0	3	0	0	6
Mustard oil	.. 1½	0	3	0	0	8	5½
Small fish	.. 2	0	0	9	0	2	10
*Mutton	2-2/7	0	2	0	0	8	0
Ghee	.. 2/5	0	7	0	0	5	3
Cow's milk	.. 8	0	0	6	0	7	6
Salt, condiment and molasses	.. ..		..		0	4	0
Seasonal fruits ..	.. ..		..		0	8	7
TOTAL ..			..		5	0	0

* Mutton to be taken twice a week—8 ozs. every time and that will give a daily average of 16/7 oz. per day.

F

A sample menu of 'balanced diet' at Rs. 5 per head per month.

VEGETARIAN

Diet	Daily in oz.	Price per lb.			Total price.		
		Rs.	a.	p.	Rs.	a.	p.
Raw, pounded rice	18	0	0	9	1	9	3
Puffed rice	1	0	0	9	0	1	5
Beaten rice	1	0	0	9	0	1	5
Bengal gram	½	0	0	9	0	0	8½
Green gram	½	0	0	7½	0	0	7
Red gram	½	0	0	7½	0	0	7
Lentil	½	0	0	9	0	0	8½
Potato	1	0	0	9	0	1	5
Drumstick	1	0	0	3	0	0	5½
Tomato (ripe)	½	0	0	6	0	0	5½
Carrot	1	0	0	3	0	0	5½
Bitter gourd	1	0	0	6	0	0	11
Amaranth	1	0	0	3	0	0	6
Fenugreek	1	0	0	3	0	0	6
Mustard oil	1½	0	3	0	0	8	5½
Cow's milk	16	0	0	6	0	15	0
Dahi	4	0	0	6	0	3	9
Ghee	½	0	7	0	0	6	7
Salt, condiment and molasses	..				0	4	0
Seasonal fruits	..		..		0	4	0
TOTAL	..		..		5	0	0

G

A sample menu of 'balanced diet' at Rs. 6 per head per month.

NON-VEGETARIAN

Diet.	Daily consumption in ozs.	Monthly consumption in ozs.	Price per lb.		Total price.		
			As.	p.	Rs.	a.	p.
Raw, home pounded rice ..	16	480	0	10½	1	10	3
Beaten rice	1	30	1	6	0	2	9¾
*Bengal gram	.5	15	1	0	0	0	11¼
*Green gram	.5	15	1	0	0	0	11¼
*Red gram	.5	15	1	3	0	1	2
*Lentil	.5	15	1	0	0	0	11¼
*Potato	1	30	0	6	0	0	11¼
*Tomato	.5	15	0	6	0	0	5½
*Carrot	1	30	1	0	0	1	10½
*Bitter gourd	1	30	1	0	0	1	10½
*Amaranth	1	30	0	6	0	0	11¼
*Fenugreek	1	30	0	6	0	0	11¼
Mustard oil	2	60	4	0	0	15	0
Salt, condiment and molasses ..	..	..	..		0	4	2¼
Small fish ..	2	60	2	0	0	7	6
Seasonal fruits	..	..	..		0	3	0
Milk	8	240	1	9	1	10	3
TOTAL		..	..		6	0	0

*All the items in the menu need not be taken every day. As for instance, two ozs. of each pulse may be taken every day by rotation, instead of ½ ounce of all the pulses every day, as written in the menu. The other bracketed items in the menu may also be similarly taken by rotation so that the total quantity consumed remains the same. If preferred, two ounces of fish may be substituted for one ounce of dal.

H

A sample menu of 'balanced diet' at Rs. 6 per head per month.

Vegetarian

Diet.	Daily consumption in ozs.	Monthly consumption in ozs.	Price per lb.		Total price.		
			As.	p.	Rs.	a.	p.
Raw, home pounded rice ..	16	480	0	10½	1	10	3
*Puffed rice	1	30	2	0	0	0	9
*Beaten rice	1	30	1	6	0	2	9¾
*Bengal gram	.5	15	1	0	0	0	11¼
*Green gram	.5	15	1	0	0	0	11¼
*Red gram	.5	15	1	3	0	1	2
*Lentil	.5	15	1	0	0	0	11¼
*Potato	1	30	0	6	0	0	11¼
*Tomato	.5	15	0	6	0	0	5½
*Carrot	1	30	1	0	0	1	10½
*Bitter gourd	1	30	1	0	0	1	10½
*Amaranth	1	30	0	6	0	0	11¼
*Fenugreek	1	30	0	6	0	0	11¼
Mustard oil	2	60	4	0	0	15	0
Salt, condiment and molasses ..	..	..	..		0	4	9¼
Milk	8	240	1	9	1	10	3
Seasonal fruits	..	..	..		0	6	2
Total ..	..	..	..		6	0	0

*All the items in the menu need not be taken every day. As for instance, two ozs. of each pulse may be taken every day by rotation, instead of ½ ounce of all the pulses every day, as written in the menu. The other bracketed items in the menu may also be similarly taken by rotation so that the total quantity consumed remains the same.

I

A sample menu of 'balanced diet' at Rs. 6 per head per month.

NON-VEGETARIAN

Diet.	Daily consumption in ozs.	Monthly consumption in ozs.	Price per lb.		Total price.		
			As.	p.	Rs.	a.	p.
Raw, home pounded rice ..	8	240	0	10½	0	13	1½
Atta	8	240	1	0	0	15	0
Beaten rice	1	30	1	6	0	2	9¾
*Bengal gram	.5	15	1	0	0	0	11¼
*Green gram	.5	15	1	0	0	0	11¼
*Red gram	.5	15	1	3	0	1	2
*Lentil	.5	15	1	0	0	0	11¼
*Potato	1	30	0	6	0	0	11¼
*Tomato	.5	15	0	6	0	0	5½
*Carrot	1	30	1	0	0	1	10½
*Bitter gourd	1	30	1	0	0	1	10½
*Amaranth	1	30	0	6	0	0	11¼
*Fenugreek	1	30	0	6	0	0	11¼
Mustard oil	2	60	4	0	0	15	0
Salt, condiment and molasses ..	..	..	..		0	2	10¾
Milk	8	240	1	9	1	10	3
Small fish	2	60	2	0	0	7	6
Seasonal fruits	..	..	..		0	3	0
TOTAL ..	..	..	..		6	0	0

* All the items in the menu need not be taken every day. As for instance, two ounces of each pulse may be taken every day by rotation of ½ ounce of all the pulses every day, as written in the menu. The other bracketed items in the menu may also be similarly taken by rotation so that the total quantity consumed remains the same. If preferred, two ounces of fish may be substituted for one ounce of dal.

J

A sample menu of 'balanced diet' at Rs. 6 per head per month.

VEGETARIAN

Diet.	Daily consumption in ozs.	Monthly consumption in ozs.	Price per lb.		Total price.		
			As.	p.	Rs.	a.	p.
Raw pounded rice	8	240	0	10½	0	13	1½
Atta	8	240	1	0	0	15	0
*Puffed rice	1	30	2	0	0	3	9
*Beaten rice	1	30	1	6	0	2	9¾
*Bengal gram	.5	15	1	0	0	0	11¼
*Green gram	.5	15	1	0	0	0	11¼
*Red gram	.5	15	1	3	0	1	2
*Lentil	.5	15	1	0	0	0	11¼
*Potato	1	30	0	6	0	0	11¼
*Tomato	.5	15	0	6	0	0	5½
*Carrot	1	30	1	0	0	1	10½
*Bitter gourd	1	30	1	0	0	1	10½
*Amaranth	1	30	0	6	0	0	11¼
*Fenugreek	1	30	0	6	0	0	11¼
Mustard oil	2	60	4	0	0	15	0
Salt, condiment and molasses	..	..	..		0	2	10¾
Milk	8	240	1	9	1	10	3
Seasonal fruits	..	..	..		0	6	2
TOTAL	..	..	..		6	0	0

Grow more food

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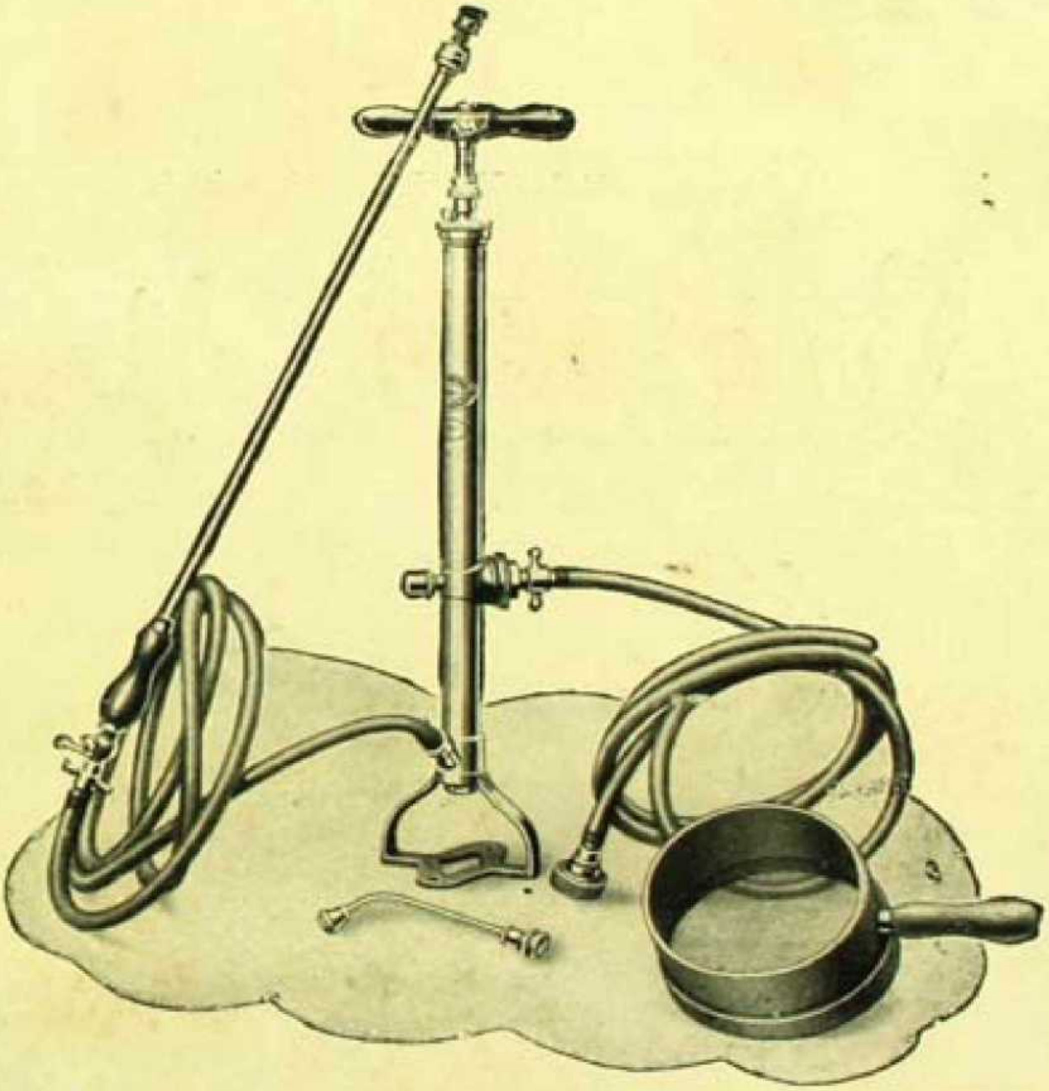

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